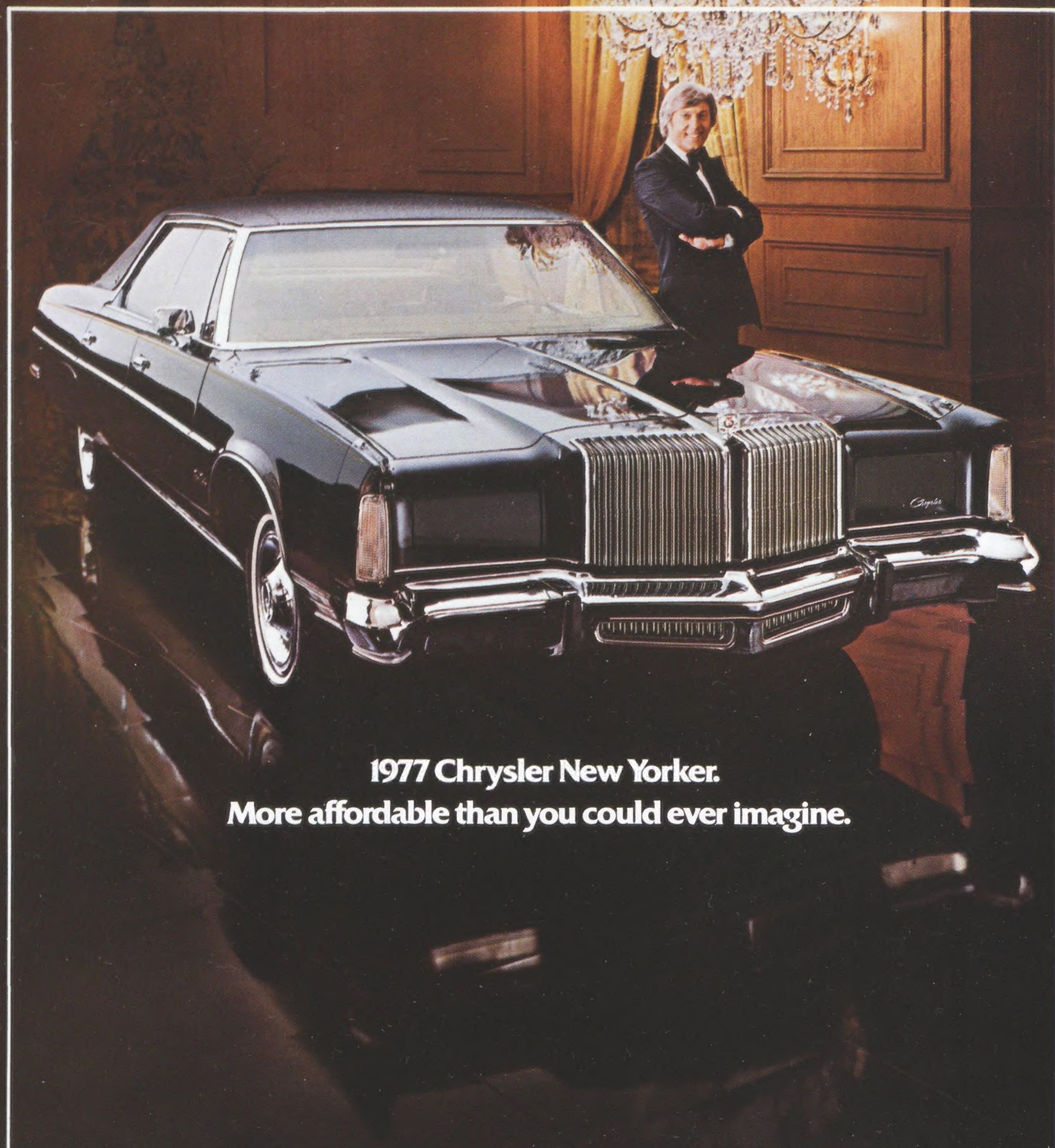
November 1976

Smithsonian

Tut's treasures (p.42) will tour six American cities. This is the mighty god Ptah of Memphis



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And now, to the beauty of Chrysler New Yorker, we've added the brain. The Lean Burn Engine* that actually thinks. Its small computer constantly monitors engine conditions and adjusts ignition timing with split-second accuracy. The result is more responsive acceleration and performance.

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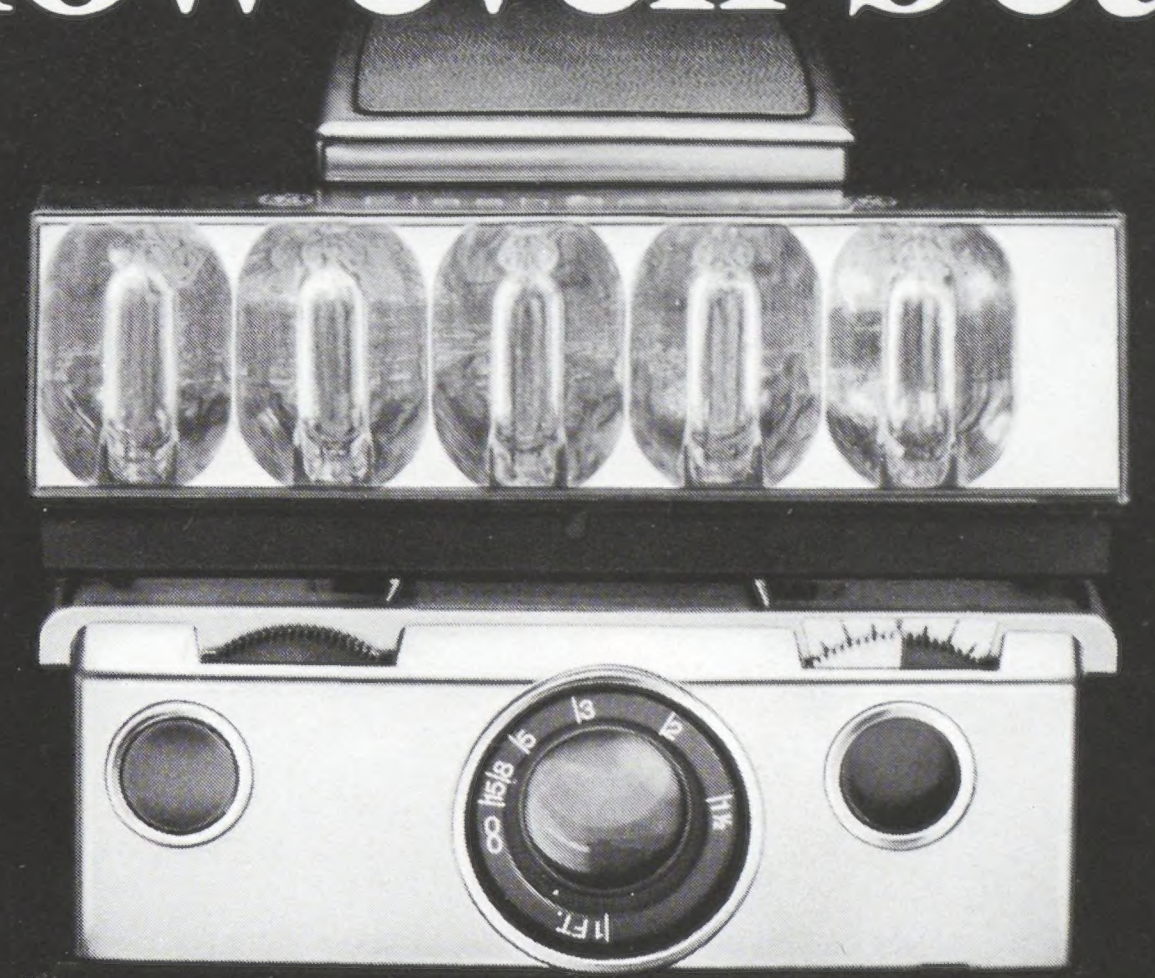

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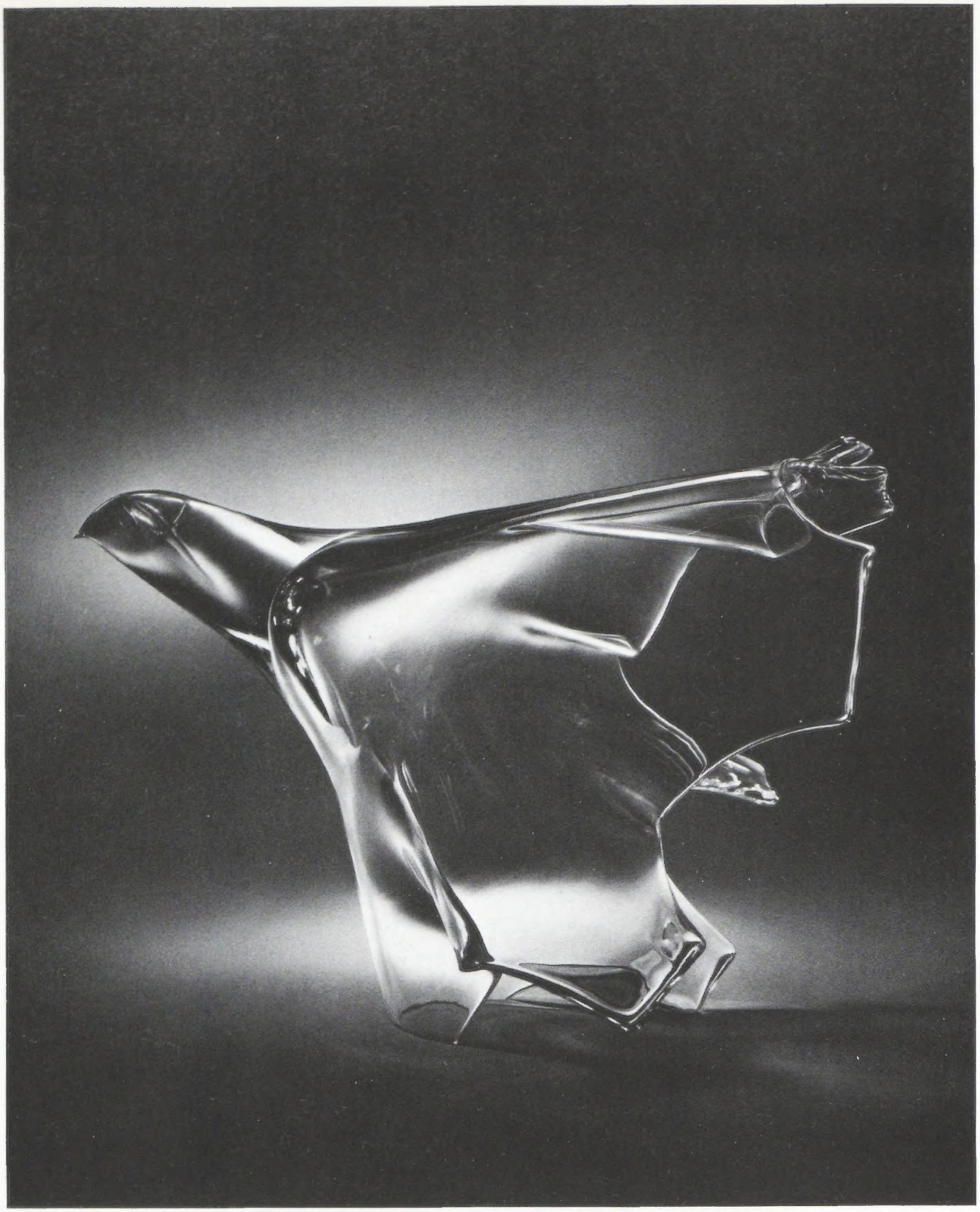

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November 1976 Volume 7, Number 8

Smithsonian

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Energy for a st

EXXON ANSWERS QUESTIONS ABOUT ONE OF THE NEWEST SOURCES OF ENERGY UNDER THE SUN—THE SUN!

Exxon is putting its years of energy experience to work to turn sunlight into a practical form of energy. We've learned a lot about its potential and its limitations, and we'd like to answer a few questions people have asked.

"What kind of energy do we get from the sun?"

Two kinds—heat and light. The heat can provide energy for heating, cooling and hot water systems. The light can be turned directly into electricity.

The basic technology for using the sun's warmth is known. In fact, solar energy is already being used to heat buildings and homes—almost always along with conventional systems.

Our photo shows an example of a solar project initiated by the Bay State Gas Company. The solar panels on the roof of this Massachusetts house capture the sun's rays for heating and hot water.

"What does it cost to heat a house with the sun?"

Right now a solar heating system can cost you anywhere from $8,000 to $20,000. This is in addition to the conventional heating system you'd also need, which would cost about $2,600 for the average-size house. An auxiliary system is necessary because no one has perfected a way to store enough solar heat to get you through several cloudy days.

"How much do solar systems cost to heat water for sinks, tubs and washers?"

Around $2,000—about three times more than conventional systems. They would be particularly suitable for people who live in high energy cost areas.

"Why don't more people use solar heating?"

The systems and storage facilities are still expensive to manufacture. And there are other problems.

For instance, installers, maintenance people and distributors have to be established and trained. Financing methods and warranties have to be worked out. Building codes have to be adapted. And cities have to deal with "sun rights." (What happens if someone builds a tall building that overshadows a smaller one?)

"How much does electricity from the sun cost?"

Systems that turn sunlight directly into electricity are not as widely used as solar heating systems. Because the solar cells required are costly to make, the electricity they produce is quite expensive. At current prices, solar electricity costs roughly $1.00 to $3.00 per kilowatt-hour. Compare this to the 2¢ to 6¢ you may now be paying for conventional electricity.

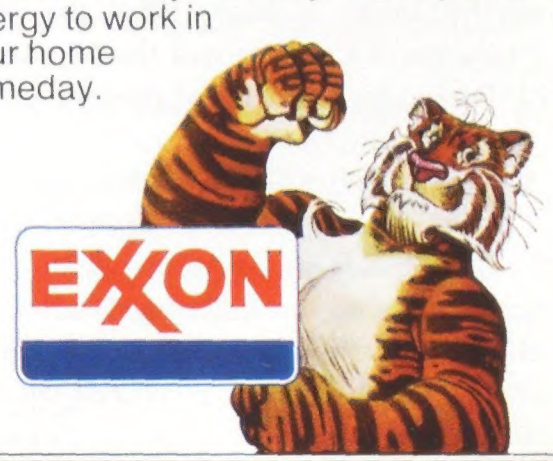
"When will solar power become a major source of energy?"

Possibly in the next century. That's because a considerable amount of technology still has to be developed.

But you may not have to wait that long to get solar heat. Exxon is working to make solar heating systems more economical and available within the next few years.

"Why is Exxon involved in solar energy?"

Because we're more than just an oil company. We've been conducting productive research for over 50 years. During that time, we've gained experience, expertise and management skills in energy technology. And we're putting it to work today so that you can put solar energy to work in your home someday.



rong America

The view from the castle

This nation's greatest collection of design materials, long imperiled, is safe at last in Smithsonian's Cooper-Hewitt Museum

More than a decade ago an article appeared in the *Saturday Review* entitled "The Case of the Vanishing Museum." At the time a small tempest was brewing over the decision of the trustees of Cooper Union in New York to close its Museum for the Arts of Decoration, a scholarly resource much beloved by designers—and a lifelong passion of the three Hewitt sisters, granddaughters of Peter Cooper, who had founded the institution that bears his name in 1859. The article was one of a series in newspapers and magazines across the country deploring the possible dispersal of the museum's peerless collections of textiles and wallpaper, metalwork, glass, porcelain, architectural and other drawings; its huge collection of prints; its paintings; and its highly specialized and invaluable library. All of this made it, along with the Victoria and Albert Museum in London and the Musée des Arts Décoratifs in Paris, one of the great centers for the study of design.

By way of response, a "Committee to Save" was hastily formed under the chairmanship of the late Henry Francis du Pont of Winterthur, doyen of decorative arts collecting in America. While this abrupt tropical disturbance on the museum horizon caused temporary dismay to everyone, it veered off into the arms of a select committee of inquiry appointed by the American Association of Museums under the chairmanship of its president, Charles van Ravenswaay.

More than a year later, the AAM committee recommended that the Smithsonian Institution take over the Cooper Union collections and run them for the benefit of designers, students and lovers of the decorative arts, including contemporary design.

Led by John Nicholas Brown, the Board of Regents of the Smithsonian voted to undertake the task, contingent upon finding suitable quarters in New York and obtaining private funds for support—for it was a venture somewhat outside the usual, even for *this* ultimate repository of collections deemed to be in the national interest.

Now, at last, the Cooper-Hewitt Museum of Design has opened in the restored Andrew Carnegie mansion on Fifth Avenue (p. 72). It was Thomas Hoving (then New York's parks commissioner) and my late friend Stephen Currier who gave us the inspiration to seek out this great house. The Carnegie Corporation responded with munificent generosity and comprehension. Committees of friends, from Mr. du Pont himself through generous donors such as Mrs. Enid A. Haupt and Mr. and Mrs. Henry J. Heinz II, to the Andrew K. Mellon, Mobil, Kress and J. M. Kaplan foundations and the Johnson Wax Company, have all understood the need and appreciated the dedication of our director, Mrs. Lisa Taylor, and her staff.

This is *the* national museum of design; it should be the repository for designers' archives (which it already is in part), a working place for students of all ages in this essential field, and it should be maintained in New York. For New York, despite recent buffetings, is still our national design center. The Smithsonian has tried its best to live up to its responsibility since accepting the gift. Now it is up to New York and the rest of the nation to accept the task of providing continuing support for this great new museum.

S. Dillon Ripley

Ten things that will happen when you test drive Oldsmobile's new Delta 88.

1. Your first look will impress you.

The new proportions. Crisp. Contemporary. Clean. And the practicality of those lines will come to you as you drive this roomy new car.

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It's the way we've redesigned the door openings. Which also makes getting out easier. Which you may not want to do, once you've experienced driving it.

3. You'll sit comfortably.

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4. You'll like the visibility.

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The instrument panel is designed to put all instruments in easy view and easy reach. So there is a distinct feeling of control in the driver's seat.

6. The ride is smooth and comfortable.

Olds engineers used computers to select the right combination of springs and shock-absorption rates. Result: a ride that's smooth and stable even over rough roads.

7. Suddenly it is very quiet.

Drive over a bumpy road or past a noisy construction site and give Delta 88 a real test. New body and engine mounts help isolate vibration, while new sound-absorption materials help insulate the passenger compartment.

8. Find a place to make a U-turn.

It's the best way to see and feel the 88's new tighter turning radius. You'll really appreciate it in a tight parking situation.

9. Make sure you take your family along.

Because you'll want them to experience (along with you, of course) the improved head room, and the increased leg room in back.

10. Improved gas mileage.

You can't experience it in a test drive. But smaller, lighter engines provide improved fuel economy in the new Delta 88: 25 mpg in the EPA highway test and 18 in the city test with the standard 231 V-6 engine, automatic transmission and rear axle. (EPA estimates. Your mileage depends on how you drive, your car's condition, and its equipment. In California, EPA estimates are lower.)

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Now take a few minutes to discover in a test drive its efficient new combination of roominess, comfort, and maneuverability.

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The Independence Hall Inkstand

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IN LIMITED AND REGISTERED EDITIONS ISSUED BY THE LIMITED EDITIONS COLLECTORS SOCIETY

56 names, signed with ink from this time-honored stand, inscribed on an unyielding declaration "for all mankind."

When 56 men dipped quill pens into this ink pot, they signed their names to the Declaration of Independence — thereby pledging "their lives, their fortunes, and their sacred honor" — to the cause of freedom.

Drafted by a five-man committee which included Benjamin Franklin and John Adams, the Declaration was actually written — masterfully, indeed — by Thomas Jefferson. His purpose, as he explained later, was to make the document "an expression of the American mind." And, in its calm strength and dignified simplicity, its basic appeals to reason and justice, it transcends time and space. As the Signers themselves remarked: they knew they were acting not only for themselves but "for all mankind."

Today, the Inkstand used by the 56 Signers is the only remaining artifact from the Eighteenth Century — besides the Declaration of Independence itself — that was actually touched by so many of our founding fathers.

After the signing of the Declaration, the same Inkstand was used again and again in writing numerous drafts of our first Constitution, plus later drafts of the Articles of Confederation, including the final draft. It was then used again in 1787 in drafting and amending the final version of our Constitution, and also for the actual solemn occasion of the final signing of that magnificent document.

An original creation by the 18th Century silversmith, Philip Syng . . . now flawlessly recreated by the 20th Century craftsmen, Reed and Barton.

Aside from its historical significance, the Inkstand is famous among professional antique appraisers as a most masterful example of 18th Century American silversmith art. It is the work of Philip Syng of Colonial Philadelphia — a name commanding instant respect among collectors, especially all those who appreciate fine antique silver.

To accurately duplicate Syng's beautiful creation, the Collectors Society engaged the Reed and Barton Corporation of Taunton, Massachusetts — one of the oldest and most honored names in American silver. Their artisans spent considerable time in Philadelphia working with the original as their pattern. Through the courtesy of the Curator of Independence Hall, they made detailed wax impressions and plaster-of-paris molds. From these, plus precise photos and measurements and drawings, they painstakingly created the first prototype reproduction.

How the "56 Signers" influenced the Collectors Society in setting limits on the number of Official Inkstands that will ever be issued.

The Limited Edition is being very closely restricted, as follows: only 56 pieces will be made in Heavy Gold Vermeil on Solid Sterling Silver (just one for each Signer); 560 pieces in Solid Sterling Silver (representing ten for each Signer); 5,600 pieces in either Silver Plate or Gold Plate (100 for each Signer). Prices of the Limited Edition range from $390 to $1,950, as shown on the Commissioning Order Form below.

There are also two fine Pewter finishes available in our Registered Edition — a satin finished Pewter at the modest price of $250 and a gleaming polished Pewter at $290.

For formal display, a separate museum display plinth (11" long and 8" wide by 15/16" thick) mounted with a plaque bearing the registration number is available in either Rosewood for $40 or Walnut for $25.

Gold Vermeil
Rosewood Plinth

How the Independence Hall Inkstand will grace any room in your home, regardless of style of decor.

To view the Inkstand in all its understated grandeur in the Assembly Hall at Independence Hall is to cherish it. It is an extremely handsome piece of art for any age. Like the Declaration itself, it will be "at home" anywhere in America. It is wonderfully versatile (again symbolic of the time-tested Declaration) from a purely decorative standpoint — simple enough to harmonize with even the most modest decor of any home or office, yet elegant enough to enhance even the most grandly furnished setting.

When your Independence Hall Inkstand is made for you, it will be assigned, and engraved with, an individual serial number which will be recorded in the Master Registry of Ownership. This — together with your Certificate of Authenticity which carries the symbol of the American Revolution Bicentennial Administration (designating your purchase as an ARBA "Officially Recognized Commemorative") — will protect its collector value from ever being dimished by shoddy imitations and counterfeits.

A portion of the proceeds from the sale of these reproduction Inkstands is pledged to a special fund to aid in the preservation of Independence Hall.

Why your commissioning an authorized Inkstand is not only an investment in history, but may well prove a shrewd financial investment as well.

As so many far-seeing and now fortunate Americans have discovered, both silver and gold (whether in the form of ingots, coinage, or objects of art) have been protective bulwarks against inflation. Economists do not marvel at this; it is one ofthe world's oldest phenomena.

Precious metal art objects like the Inkstand particularly expand their value, because in addition to their intrinsic worth, made up of so many ounces of silver and gold, they offer the "add-on" value of aesthetic appreciation. Another facet of their value is the factor which makes precious metals valuable to begin with — relative scarcity. Only a limited supply of the precious metal versions of the Inkstand reproductions will ever come into being at all, and as the years pass, each reproduction in a Limited Edition should attain an ever-increasing rarity.

How to commission, without delay and possible disappointment, the crafting of your personal Independence Hall Inkstand . . . and begin enjoying this American treasure in your own home.

As you can readily understand, only a limited number of Americans will ever have the privilege of owning one of these authentic Official Independence Hall Inkstands. But the Society must receive your order and inscription before the silversmiths and engravers can complete the making of yours.

To commission your own serial numbered Inkstand, simply fill out and mail the commissioning order coupon below. Upon receipt of your order, with your deposit, you will be promptly informed of the ownership number assigned to you, along with the estimated date of delivery. And rest assured: as with every item offered by the Collectors Society, your Indepenrence Hall Inkstand will arrive with an unconditional guarantee.

Soon you will be enjoying, in your home or office, the three-dimensional treasure which symbolizes most fully the power of the Declaration of Independence — the very Inkstand that held the quills, the ink, and the blotting sand by which the Signers subscribed their names to immortality.

Since a number of orders have already been received, and the total readership of *Smithsonian* exceeds 2,500,000, we urge you to act promptly to avoid disappointment before the Editions are closed.

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This official symbol will appear on each Owner's "Certificate of Authenticity" which is printed on 8½" x 11" parchment suitable for framing. Each Independence Hall Inkstand is an officially recognized Commemorative of the American Revolution Bicentennial Administration (#76-19-0615), authorized by Public Law 93-179 of the Congress of the United States.

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Walnut Base	$ 25 ☐	(None)

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The first of three COMSTAR satellites has inaugurated a system that will handle 28,800 long-distance calls simultaneously. It will permit the paths of long-distance calls to be routed more flexibly, to speed service when telephone traffic is heavy.

Also, thanks to the cooperation between GTE Satellite Corporation and AT&T, the system covers the entire country efficiently with a minimum number of earth stations and satellites.

Uniting a satellite system with the domestic phone network is an idea whose time had come.

Phenomena, comment and notes

Why gymnasts groan, mushroom clues for sleuths, perils of periodontitis, marsh economics, and the biggest hole

Six or seven hundred thousand years ago, just about the time that modern Man was emerging from the genetic stock of his slightly more boneheaded forebears, another, more discrete, event took place. It was certainly a more dramatic event than Man's gropings toward humanity must have seemed at the time, and certainly a great deal less significant in the long run, though it was far more destructive than even 20th-century Man has managed to be except on one or two occasions.

What happened, it is postulated, is that an object at least two-and-a-half miles across, weighing 13 billion tons, struck the Earth at 44,000 miles an hour. It gouged out a valley 150 miles wide and a half-mile deep—a task even the Army Corps of Engineers (see our next issue) might blush at proposing to Congress.

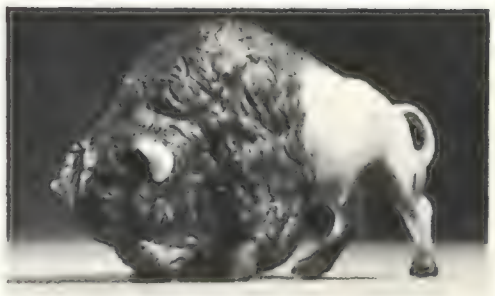
The problem is that no one, not even Neanderthal Man, was around to see it (if indeed it occurred at all) because the point of impact was in Antarctica, on the Australian side of that continent, where no one had ever lived until it became a second home for some scientists and tourist attraction for penguin lovers.

The massive object came from outer space, but lest the usual group of romantics start claiming the event as proof of earthly visits from space civilizations (in this case, no doubt, a space civilization a bit lacking in precise navigational skills), the object was probably a meteorite—in fact, the largest meteorite ever to hit the Earth. Just how tenuous this whole idea

He called the Buffalo, calmed the waters and healed the sick. Beaverhead, a dealer in magical spells, the Medicine Man of the Blood Tribe of the Blackfeet captured in porcelain 11 inches tall, by the artists of Cybis.

The Blackfeet, Dakotas, Onondagas, Shoshone—tribes with names like drum beats—are all celebrated in the Cybis North American Indian collection.

And they are just part of the enchanted world of Cybis. A world where the Buffalo has not vanished, the signal fires still burn, and flowers and children bloom forever. Enter our world and find your own magic.



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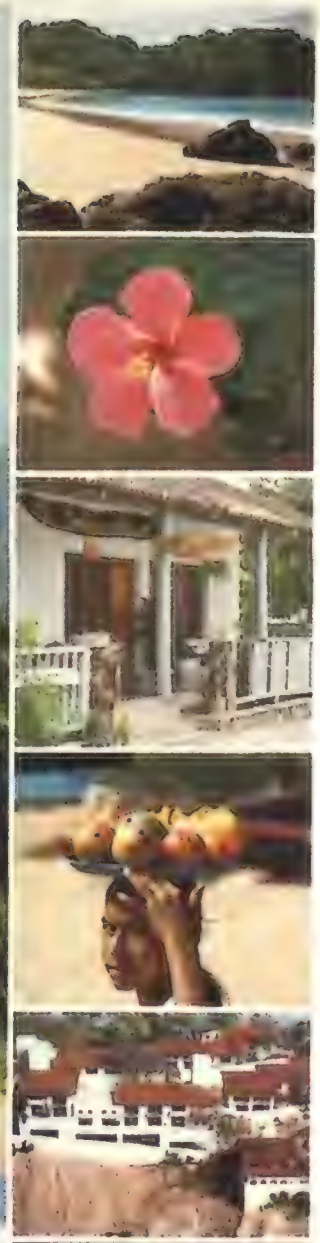

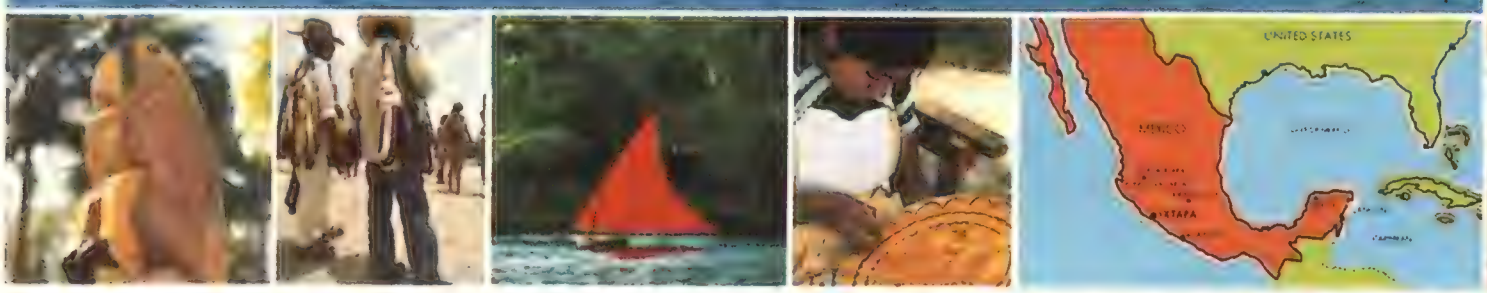

Where the resort of the future meets the Mexico of the past.

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is can be suggested by the fact that no one has ever set foot in the valley: it lies beneath a mile of polar ice.

But the impact crater's existence was suggested 16 years ago by a University of Wisconsin scientist, Virgil Barnes, to explain the existence on Australia of tektites, mysterious, walnut-sized glassy objects which might have come from the moon (the result of meteorite impacts there splashing material down onto Earth) or which might have been splashed out from the impact of meteorites on Earth. The Antarctic connection made aerodynamic sense to Dr. Barnes.

Recently we have gained more information than Dr. Barnes had available to him: (1) tektites are made of stuff that is unlike that of the moon; (2) given the seismic information and gravity measurements available now, there really *is* a big wide valley under the ice in Antarctica's Wilkes Land and (3) we know more about the uneroded meteor craters of the moon now. They are pretty much like what scientists think is below the Antarctic ice, and ice would protect an ancient crater from the disfigurement of the elements.

It's all hypothesis at this stage, of course. It hasn't even been published in the scientific literature. The technical papers written about the subject recently have been held up because the authors failed to give Dr. Barnes credit for his original guess. According to *Science News* (Volume 110, Number 10), this impolite oversight will soon be corrected, the scientific fraternity will be duly informed, and it will become an official hypothesis.

Until that time, one can take *some* comfort from the fact that whether or not the Earth was bombarded in such a manner at the moment Man emerged, we have at least come far enough to demand courtesy and proper credit when discussing long forgotten events. These days, we should be pleased with every sign of gentleness in human relations.

Speaking of human relations, there have been objections registered to the above use of the phrase "the emergence of modern Man" as a sexist slip of the tongue. Consultation with the dictionary shows that the word "Man" means "any human being, regardless of sex or age; a member of the human race, a person . . ." and also "A member of the genus *Homo*. . . ." There is also an etymological connection with the Latin *manus*, which means hand,

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the use of which remains the most obvious characteristic of our species in all but the most sophistical discussions. In this magazine, the word Man, unless otherwise noted, signifies the human species, female and male, and not necessarily in that order.

Cherchez the mushroom

The latest in forensic science is, of all things, mushrooms. It seems that there is a fairly well-known Japanese mushroom, relatively common in forests, named *Hebeloma vinosophyllum* Hongo, which until recently was thought to have no particular ecological requirements. But now a Japanese biologist, Naohiko Sagara, has reported to *Nature* (Volume 262, Number 5571) that this mushroom seems to grow where a mammal has been buried in the soil. In fact, Dr. Sagara kept a series of the mushroom fruiting by regularly replacing cat remains under the soil. This is apparently the first mushroom known to take advantage of mammal-treated soil (there are some that grow on the bodies of caterpillars, and some fungi that grow directly on human corpses).

People doing away with fellow mammals, then, are advised to bury them deeply lest the telltale mushrooms give the crime away. At least, such is the case in Japan. Dr. Sagara suggests that a closely related—and ominously named—species, *Hebeloma sarcophyllum* Peck, which occurs in Europe and North America, may have the same forensic value.

A theory for saving teeth

One of the most widespread diseases in the world is periodontitis, the process whereby, with age, the gums become inflamed, the teeth loosen and the alveolar bone of the jaw somehow melts away. The result is tooth loss. According to *Search* (Volume 1, Number 3), a publication of the State University of New York, two-thirds of all Americans over 50 and four-fifths of those over 60 suffer from the disease. In India, only ten percent of those past middle age still have teeth.

Until recently, there has been practically no solid research done on this scourge. Generally it is considered to be a matter of improper oral hygiene, which permits a substance called plaque to accumulate on the teeth. It is assumed that the bacteria in plaque produces chemicals

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which create inflammatory reactions which invade the alveolar bone, causing it to dissolve. The trouble with this widely accepted theory is that no one has yet established the actual chemical mechanisms in the process.

Another question also arises, asked by Dr. Lennart Krook of SUNY's College of Veterinary Medicine at Cornell: "I don't understand. Animals don't brush their teeth, but if they are properly fed they don't lose their teeth. So too with primitive peoples." More than a decade ago Dr. Krook was studying bone diseases in monkeys. He was able to reproduce bone problems in a variety of animals by withholding calcium from their diets. He then added calcium to an ailing zoo tiger's diet, along with bones to gnaw on, and the tiger's bone disease went away.

It seems that if you don't eat enough calcium, the body begins to cannibalize its own stores of the mineral—and not only are the bones the obvious storehouse, but the alveolar bone of the jaw is the most highly mineralized one. Periodontitis, suggests Dr. Krook, is merely the first sign of deteriorating bones elsewhere, and he reports finding that people with advanced periodontitis also have a thinning of bone tissue in the ribs and vertebrae.

He recommends that one ingest 1,100 milligrams of calcium daily. Most Americans ingest 800 or less, and the average intake is decreasing as we eat less milk and cheese. And another mineral important in the process, phosphorus, must be ingested in equal amounts: too much phosphorus causes the same problem as too little calcium. But Americans eat nearly three times as much phosphorus (in meat, poultry and fish) as they do calcium. In countries where calcium intake is high, such as Finland and the Sudan, periodontitis is rare.

It should be pointed out that Dr. Krook is considered a maverick in the field. The dental profession dismisses his evidence and his theory, and, on one occasion, booed him at a dental meeting. One hopes that further research will be done; meanwhile, 100 million periodontal sufferers must await the results.

Swampy economics

There have been various attempts to put a dollar value on natural systems, this being a good way to argue for their survival against developers. In other words,

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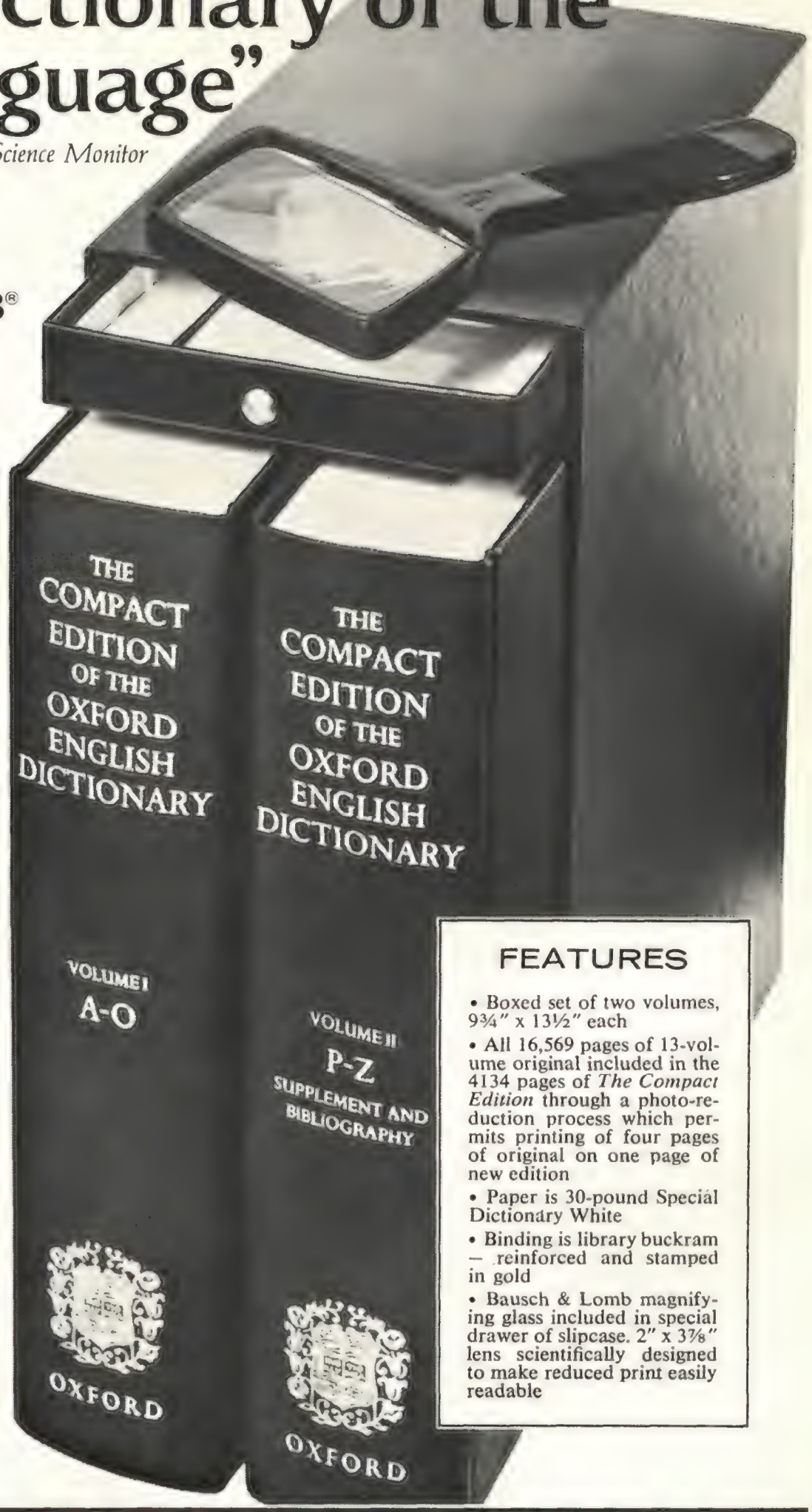

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the idea is to convert nature into an economic interest on its own. An ecologist at the University of Georgia, Eugene P. Odum, has been in the forefront of this effort, attempting to put a value on the energy flow of estuaries (see SMITHSONIAN, December 1974).

Professor Odum has now come up with the bottom-line figure, according to *Technology Review* (Volume 78, No. 8). He has analyzed the value of fish and shellfish, and of sports fishing because of the estuary's role as a nursing ground for sports fish. He has examined the estuary's potential for aquaculture. And he has looked at the estuary as a natural waste treatment plant.

Odum proposes a total annual return of $4,100 per acre of marshland—the equivalent of the return at five percent interest on an investment of $82,000.

On fish schooling

The schooling of fish is a form of group cohesion that apparently enhances the fishes' chances for survival, and it is generally thought that fish are able to maintain this precise, orderly ballet by means of the senses of smell and hearing, but preeminently by the sense of sight (SMITHSONIAN, January 1974). There are, however, some small African fish called *Marcusenius cyprinoides* L. which show schooling behavior by lining up in parallel rows and by swimming single file, but which are noctural and inhabit turbid water, making visual clues useless.

However, these fish are also weakly electric, emitting small discharges which can be picked up by their brethren. Peter Moller of New York's Hunter College has exhaustively studied the fish and reports his findings to *Science* (Volume 193, Number 9254). When the fish were rendered electrically inoperative through some delicate surgery, they no longer would line up in rows or swim in single file.

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sight lifts one temporarily out of the earthbound lethargy of increasing age and makes one wonder if such feats may not improve on the ancient dream of unpowered human flight.

Then along comes *Medical World News* (Volume 17, Number 18) with the prosaic and slightly grubby facts. According to that messenger of common sense and sobering news, a doctor at the University of California at Irvine has found that four times as many women gymnasts have "pars interarticularis" as does the general population. Just what *that* may mean is not explained, though it sounds like the parts don't work, but the report goes on to say that the main problem is "fatigue fracture" that may be associated with "spondylolisthesis, or vertebral slippage." Now, never mind medical definitions, vertebral slippage sounds all too familiar to those of us who curl our vertebrae over typewriters and the junk that can accumulate in an attic. In any event, and aside from scare tactics, it seems clear that a large number of gymnasts suffer from chronic lower back pain, aches and cramps, for which the only cure so far known is bed rest and no more athletics—in spite of what the coach says, his eye being on the Olympics.

The same kind of problem is likely to result from any "jarring sport" such as karate, football, hurdling, pole-vaulting and high jumping. It makes sense. After all, if Man had been chosen to become a pretzel, we either would have been provided with the number of vertebrae of a snake, or we might have been cartilaginous (no bones at all), as are sharks.

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Letters to the Editor

Foraging for food

Dear Sir: Your article on gathering natural foods in the September issue is a reminder that foraging is not necessarily limited to country walks. In Cambridge, Massachusetts, the loss of elms was a tragedy—but the stumps and roots grew great batches of edible mushrooms each spring. And in Washington, one June, we gathered more than a meal's worth of lamb's-quarters in a vacant lot, thus thoroughly impressing our hostess who had forgotten to buy greens for dinner.
Nicholas Dean
North Edgecomb, Maine

Dear Sir: In Europe, which I left 30 years ago, wild asparagus, dandelion, chicory, all kinds of berries, and particularly mushrooms, are quite important as food. Sorrel and nettles are gathered for spring soup. Crayfish is in great demand, as are snails and frogs. Since I have had some experience in catching crayfish, I don't see how Chris Letts filled the pockets of his fishing vest with crayfish when he was waist-deep in an icy stream. It is possible to pick up a crayfish, if you are lucky, but they usually run away or hide under rocks, and will crawl out of unsecured pockets. And they *do* bite. Also you need bait and a net.
Elisabeth Stenbock-Fermor
Palo Alto, California

Dear Sir: Your article on foraging for food describes in such detail the culinary delights of various wild plants that one has the impression that the wilderness is a modern-day Garden of Eden where one may nibble with impunity. The truth, alas, is that there are more than 700 species of poisonous plants in the United States and Canada. These plants are found not only in the forests and fields, but also the garden and home. Some of them contain toxins so powerful that a single bite can kill an adult.

The article did quote Euell Gibbons' rule, *"Never use any wild plant or creature for food until you have identified it and know it to be edible."* But this island of caution could be lost in the sea of enthusiasm for foraging. I think identifying plants by illustrations in books is extremely hazardous, and some of these so-called "edible" plants have toxic components. The poke you recommended (*Phytolacca americana*) has a fairly potent toxin in the root and berries and has caused fatalities. Never take a chance on wild mushrooms. The experts have a saying: "There are old mushroom hunters, and there are bold mushroom hunters, but there are no old, bold mushroom hunters." While sassafras tea is not toxic, it is known to have cancer-producing capabilities.

There will be more than 11,000 illnesses from poisonous plant ingestion this year in the United States. Plants are now the Number One poisoning agent of children under the age of five years. To be on the safe side, it is best to confine your foraging to supermarkets until you have a thorough knowledge of plants.
Robert E. Arnold, M.D.
Louisville, Kentucky

Tall Ships

Dear Sir: As I am landlocked here in New Mexico and long for seagulls, cool sea breezes and salt water, I want to thank you for the "Tall Ships" article.

I studied each photograph for what seemed an eternity and then tore myself away to read the text. When Timothy Ehlen was kidded about the handkerchief at the pier, I found that I had tears in my own eyes.
Linda L. Emery
Gallup, New Mexico

Kelp

Dear Sir: Timothy G. Branning's article, "Giant kelp: its comeback against urchins, sewage," points out that "the remaining otters were so few in number that their usefulness in urchin control was limited."

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As you mentioned, the California Department of Fish and Game has undertaken to transplant kelp by hand. It is noted in the August 1 issue of *Conservation News*, published by the National Wildlife Federation, that the California Department of Fish and Game has asked the U.S. Department of the Interior to return management of the sea otter to the state so that it can restrict the otter's range, and keep it from expanding at its current rate of "approximately 2.5 miles per year."

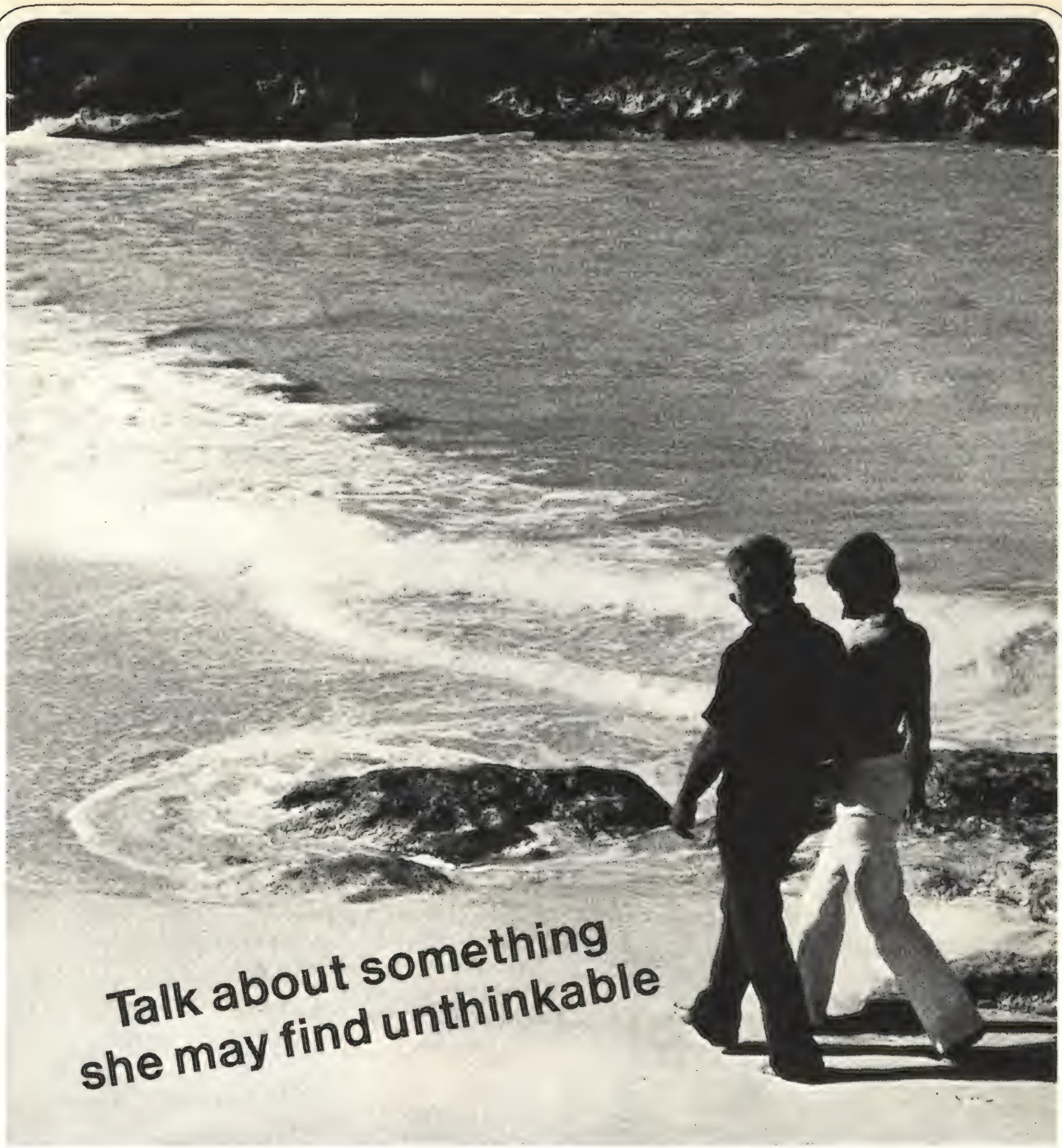
It seems ludicrous that the California Department of Fish and Game would fight extension of otter range to its previous habitat, while transplanting kelp because otters are no longer there to take care of the urchin problem.

Jeri Smithson
Woodburn, Oregon

Pioneer hairdresser

Dear Sir: At one point in Karen Thure's delightful article on Martha Harper, Alexandre F. Godefroy, a French hairdresser, is credited with the invention of the electric hair dryer. Out of curiosity, I looked into this matter at the U.S. Patent and Trademark Office. I found that M. Godefroy had several inventions, one of which was called a "Hair-Dressing Device" (patent number 389,803, dated September 18, 1888). It was a hair dryer with a bonnet attached to the chimney (stove-

pipe) of a furnace [see above]. The hair, when placed in the bonnet, is dried by the rising hot air.



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Imre D. Gregor
Rockville, Maryland

Dust devils

Dear Sir: Some years ago, near the New Mexico village of Seboyeta, I witnessed a dust-devil phenomenon that as far as I know has been unrecorded in the literature on the subject. At a coarsely sanded spot, I observed a large whorl (15 to 20 feet in diameter), surrounded by six evenly spaced whorls (three to five feet in diameter). To my surprise, the smaller whorls were turning in the reverse direction from that of the "parent" whorl.

A.S.J. Stovall jr. (Col., USA, Ret.)
Albuquerque, New Mexico

Author Sherwood B. Idso has not seen such vortices rotating in reverse, but says the phenomenon is quite possible. Ronald Schwiesow, NOAA physicist, agrees and says he believes Colonel Stovall's observations could be an important contribution to the study of atmospheric storms. Ed.

Signs and signals

Dear Sir: The history of youthful signs and signals by Margaret Lantis brings back many colorful memories for those of us who were close to the scenes of student activism. It wasn't quite fair, however, to suggest that the original Free Speech Movement (FSM) at Berkeley "concerned, first, signs bearing a then-unmentionable word." The FSM, supported eventually by thousands of students and many faculty members, emerged late in 1964 from arguments over the use of campus facilities for political organizing and fund raising. The specific issues dealt with the civil rights movement of that time and had nothing to do with obscenities.

A separate episode that became known as the "Filthy Speech Movement" occurred at Berkeley in March 1965.

Ray Colvig
Public Information Officer
University of California, Berkeley

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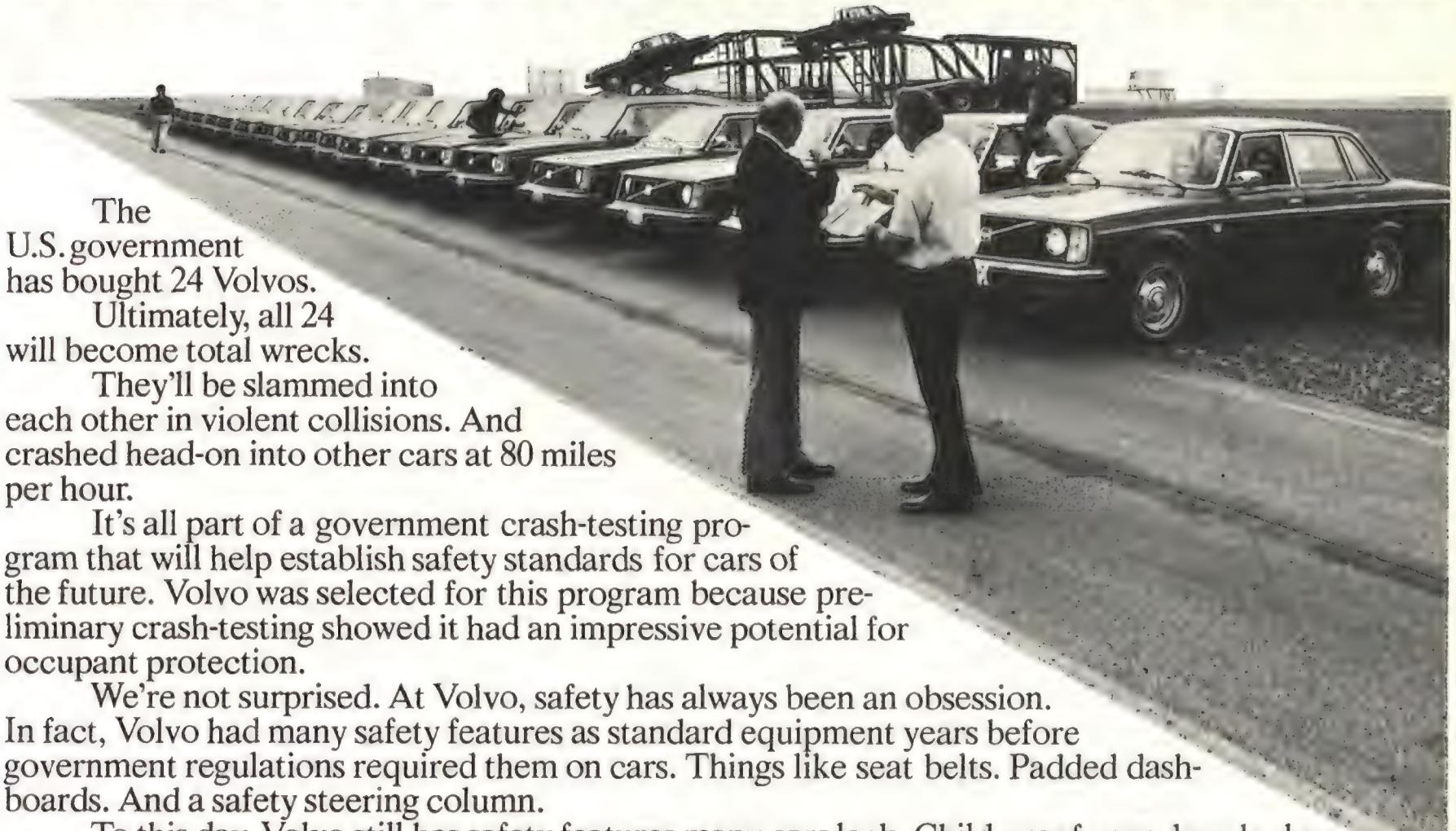

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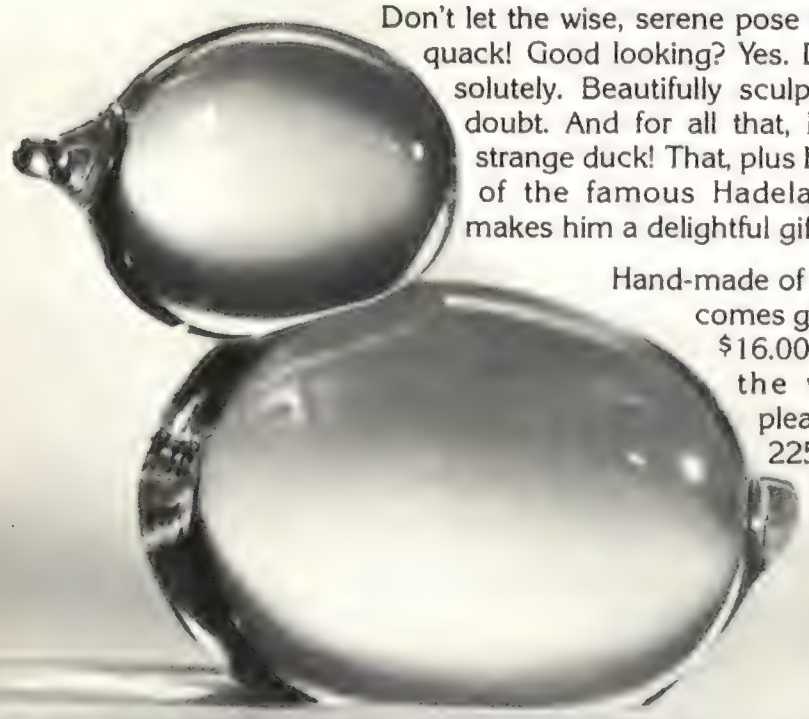

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Scarecrows

Dear Sir: Avon Neal's article on scarecrows reminds me of a drawing I made some years ago in New England of "Matilda Yifnif." I don't know how many birds she scared from the vegetable garden, but she caused quite a few farmers to stop for a closer look [see below].
James Swann
Chicago

Frisbees

Dear Sir: As a member of the Kalamazoo College Ultimate Frisbee team, you can imagine my joy at discovering Dr. Stancil E.D. Johnson's informative article. In a country overrun by footballs, basketballs, softballs, tennis balls, golf balls and Ping-Pong balls, it's a refreshing change to find a defense of that superior sports implement, the "Friz-B."
Gwendolyn R. Hughes
Kalamazoo, Michigan

Phenomena, comment and notes

Dear Sir: I enjoyed James K. Page's item suggesting gentle names for American cars. The Japanese, unlike us, give their cars such romantic names as Laurel and Violet. But anyone familiar with the madness of Japanese traffic knows that their style of driving such automobiles is far from being gentle!
Mrs. Walter E. Allan
Howey in the Hills, Florida
They also have cars named Cherry, Sunny, Bluebird and Fair Lady. Ed.

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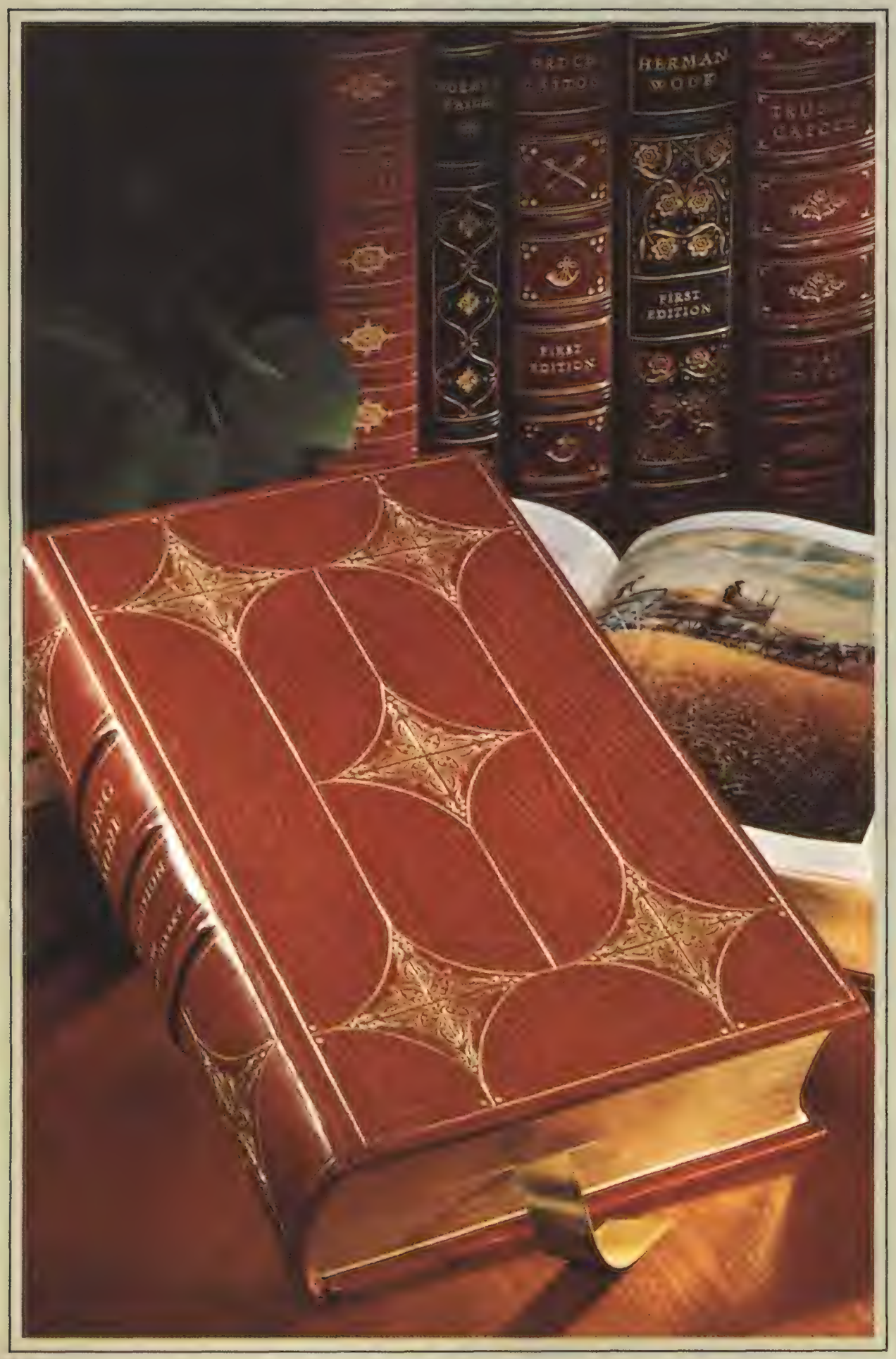

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Around the Mall and beyond

At last the long insanity is ending. We are on our way to the polls, the quadrennial deed will be done, we will soon sit before Norman Lear's TV offerings without fear of their preemption by earnest candidates. But the good old Smithsonian, being what it is, has collected the tangibles of this insanity, sorted them, tagged them and stored them away until the day when a Jimmy Carter peanut bag will draw the same oohs and aahs as the ivory-headed gavel whose raps punctuated the nomination of James Buchanan in 1856.

At the end of one of last summer's conventions, I am told, a couple of the television pundits—I believe Uncle Walter Cronkite was one—pointed out to the late-staying audience that the only figure stirring among the newly deserted seats was a Smithsonian collector, fossicking in the litter for memorabilia.

That was Herb Collins, associate curator in the Division of Political History. He is a pleasant enthusiast with short, dark hair and an old-fashioned Virginia accent—the kind that pronounces "out" the way a Canadian does: "oot." He says he went right into action as soon as the conventions adjourned so that he could beat the sweepers to such arcane treasures as a plastic elephant or a Muskie button.

Thanks to Collins' efforts, 1976 is now firmly on record in two cabinets on the fourth floor of the Museum of History and Technology. One is filled with Republican gleanings, one Democratic.

Herb Collins says he has to hunt things down in person because people are now reluctant to give away their hats and buttons and noisemakers. "Maybe they hung on to them because this is a Bicentennial year," he told me, "but I think mostly it's because people know that political souvenirs may have some value."

Collins said he did not realize at the time that he was getting national television publicity. He said it was about time people understood that Smithsonian curators have to go out and scramble around for their collections, not just sit back and wait for gifts and bequests.

I took a look at the two cabinets. The Republican one held considerably more stuff. After all, Reagan's people had their own hats and noisemakers and placards to vie with those of Ford's people. One sign proclaiming that "This Is Reagan Country" had a hand-lettered message on the back: "Rocky don't steal my sign." This referred to the incident when the Vice President plucked a Reagan placard from in front of him and threw it away. That was a unique event, the kind that will get you into the Smithsonian any old day.

The Republicans were big on hats—blue derbies, white westerns—and Collins also has the red and green basketball they were throwing around in Kansas City. There is a sunflower that opens into a

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fan and shouts its allegiance to Dole of the Sunflower State. And there is the inflatable plastic elephant, small enough to carry under your arm when you parade up and down the aisles.

The Democratic Convention, perhaps because it was sewed up from the beginning, didn't provide Collins with as much paraphernalia. Carter's green predominates in the cabinet. Straw hats with green bands indicated commitment to Carter, blue bands meant you were uncommitted. There were newspapers, T-shirts and drinking glasses (sold at Gimbels). There are the little cellophane peanut bags. I spotted buttons for all the original Democratic candidates, also one bearing the word "Amnesty," and finally one that just had Carter's teeth, all alone, bared in the well-known smile. I oohed and aahed appropriately.

"Not too great a find," said Collins. "There were a lot of them. Also, the idea's been used before."

"When?" I asked, surprised.

"One of Theodore Roosevelt's campaigns," he told me. "It's downstairs."

I trotted down to the second floor of the Museum of History and Technology, slipped past the "We the People" exhibit, which is part of the political history setup, and entered the area where a rousing speech is being given by a mannequin candidate from the observation platform of a railroad car to a gathering of mannequin townspeople. Nearby is a rectangular display of electioneering items.

Here lies the aforesaid gavel along with extravagantly carved pipes bearing the names of political hopefuls, little brown jugs proclaiming their closeness to the common taste and beakers to raise in toasts to victory (presumably drunk in whatever was poured from all those jugs).

Among all these lies a small tin plate with big shiny teeth painted on it. "Teddy's Teeth" this is called, and the instructions tell you to slip the horn that went with it through a slit that appears in it, then stick the mouthpiece between your lips and "Blow a quick, sharp blast for best effects." You are assured that this is the "Hit of the Campaign."

So much for the teeth gimmick. Collins (at right) was more excited about the peanut wrappers. After going over the whole display, I was able to settle upon a favorite. It's a small button with a picture

I always drink Cuervo Gold. Now & then.

Cuervo Especial. Tastes somewhere between the smooth of scotch and the mellow of really good cognac.

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Henredon

of a corpse lying on a coffin. Says the caption: "Too Much Politics."

Herb Collins is a fairly typical Smithsonian collector, and Ben Lawless, who helped put out the Institution film on 1876 (September's "Around the Mall"), spent some time and footage on Collins as he went about his job at the conventions. Lawless is recording in another film the Smithsonian history curators at work. He got concerned about the usual image that the word "curator" evokes: a dusty scholar reading endless tomes about the tangibles that have been left in his care. Instead, the Smithsonian curator is relatively young, surprisingly active and has the knack, says Lawless, of screening out the dross and finding the nuggets—and then going after them like stalking tigers. That's what his film will show. It will celebrate talent for finding the items that will withstand the changing interests of the years—that have true uniqueness.

The theme of uniqueness leads from one Collins to another. Last September, Michael Collins, director of the National Air and Space Museum and former astronaut, gave a speech at a banquet honoring the young contestants in the Wells Fargo essay competition (SMITHSONIAN, August 1976). In tune with the theme of essays, Collins looked ahead toward 2076 and what he had to say to his audience, all below the age of 18, recalls some of the choicest passages of his splendid book, *Carrying the Fire.*

Speaking as an Apollo 11 astronaut, Mike said he regrets that more people cannot get out into space in order to feel the impact of looking back upon Earth. You may think you know what your planet looks like from space, says Collins, for you've been engulfed by hundreds of photographs of the view. You think you can picture it. But you can't.

The reason is, you've seen the reproductions in gangs and swarms—double spreads in magazines dotted with that blue-and-white orb, front pages of newspapers solemnly lined up with the globe on every one, TV coverage that brought the view into the living room. To quote his speech: "The multiplicity of these images contradicts the feeling of being in space. . . . You have five windows in the Apollo spacecraft, and one by one you look out each. Nothing!

"That's the starting point; you have to find the Earth. You swing the spacecraft

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Mr. Collins went on to drive home the point that the fragile sphere must be preserved, that we must save it from the obvious ravages of two-ton, 300-horsepower automobiles charging off to thousands of neighborhood shopping centers, that we must develop new energy sources and conserve existing ones. ("I can get my children to talk about the sun, but I can't get them to turn out the lights when they leave a room," he noted, a little wryly.)

All good old stuff, you may say, and it's true it has been said before. But the message came across with a special verdancy when linked with that image of the unique Earth, barely discernible in all the blackness. I remember my father's ridiculous friend, Slocum, watching a sunset. The sun flamed out behind a New Hampshire mountain and left the high clouds to invent about 73 brand new colors. "If you had three sunsets like that, all to once, you wouldn't bother to look up from the milkin'," he said. I guess he was as aware as anyone of the impact of uniqueness, but when I compare his words to Mike's, I realize that I should have skewered the old fool with a pitchfork.

An article in this issue deals with the dueling pistols that were faithfully reconstructed from the Burr-Hamilton originals under the auspices of the U.S. Bicentennial Society of Richmond. I have handled them, and they are as painstakingly fashioned as many paintings—although for the very antithesis of purposes.

Some guns, as if to excuse their existence, combine some marvelous bits of art with the splendid craftsmanship of their fabrication. Last month a traveling exhibit of Belgian firearms, "Belgian Gunmaking and American History," stopped off at the Museum of History and Technology and will not continue its travels until January. Here are some 140 pistols, rifles and shotguns, all beautifully made and marvelously engraved with scrollwork, sometimes in gold.

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Some people pick up nifty all-in-one stereo compacts they believe will give them good, high-fidelity sound. But a visit to a reputable high-fidelity dealer will quickly shatter that belief. Because only there will you hear *true* high fidelity and come to realize just how inadequate everything else is.

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The $900 worth of fruitwood looks good. The $200 worth of electronics sounds bad.

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If you don't own some Pioneer components, or some of similar quality (such as that made by Marantz, Kenwood, Sansui and a handful of other dedicated companies) you're probably listening to bad sound. And it's so unnecessary. Today, in 1976, good hi-fi components (as opposed to bad "no-name" stereo systems which are ridiculously low-priced and provide sound to match) cost no more than many unsatisfactory alternatives.

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True, you can assemble a super Pioneer system that costs more than an automobile. But that's equipment designed for the high-fidelity purist to whom expense is no object.

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By Tom Prideaux

Now it's our turn to be fascinated by Tut's treasure

Sharp-eyed goddess Selket watched over a chest containing Tutankhamun's internal organs. The leopard's head symbolized his role as priest.

Thin sheet-gold covers a mirror case in the shape of an ankh, symbol of life. Mirror was polished metal. Jeweled bracelet is decorated with scarab.

Handles of alabaster unguent jar include lotus, papyrus motifs.

Ivory headrest had magical power to help the king defy death.

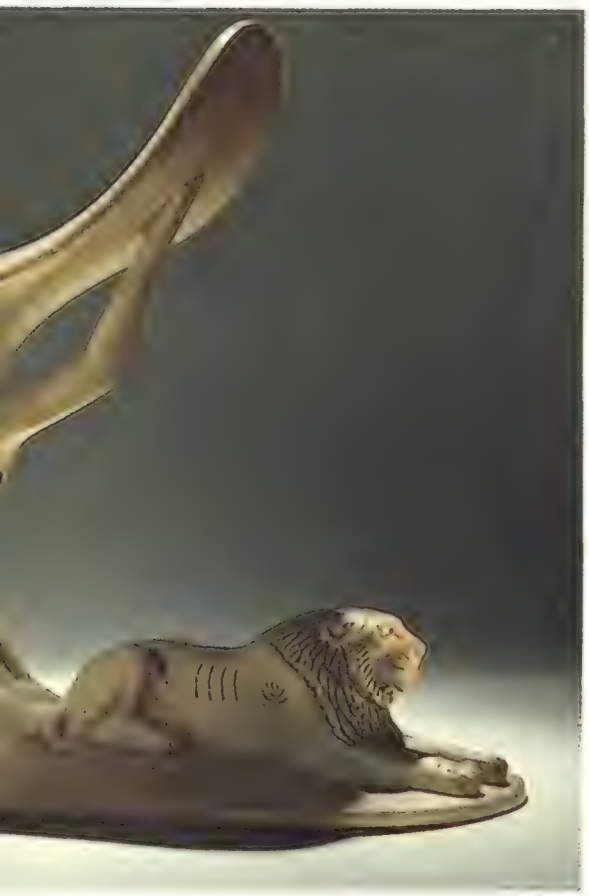
Miniature coffin of beaten gold, shown front and back, is inlaid with carnelian and glass. It is one of four that contained king's mummified viscera.

When the Egyptian government a few weeks ago sent over a prime selection of Tutankhamun's treasure for a tour of six American cities, it omitted one vital item. It should have conjured up the lively young pharaoh himself, who lived some 3,300 years ago, and sent him along as a guide. We need to shake off our awe, our sense of remoteness from the fabulous old jackpot—which it indeed was, as the photographs on these and the following pages attest—and enjoy it afresh. We need to ask the sports-loving king about his ostrich hunts, about the child's throne (p. 47) in his tomb (when was he allowed to sit on it?), and which of his magnificent jewels were family heirlooms. Also, who exactly were his parents?

Tutankhamun was crowned a pharaoh and made a god at the age of nine. His mother-in-law was Queen Nefertiti, whose celebrated portrait bust, now in a Berlin museum, argues that she was the most beauti-

The largest selection of these objects ever sent out of Egypt will travel from coast to coast for the next two-and-a-half years

Photographs by Lee Boltin



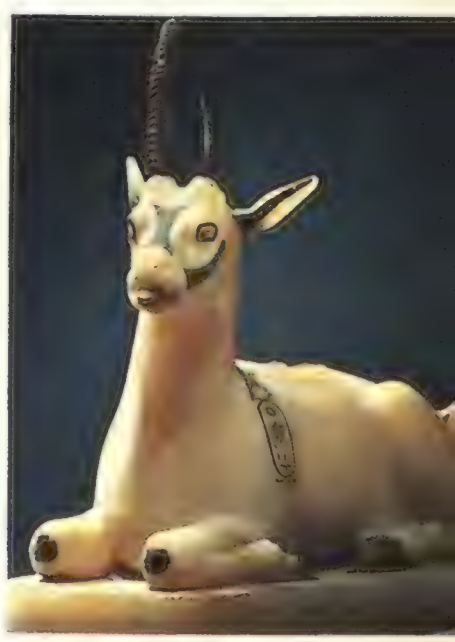
A jolly cosmetic jar is topped by lion sticking out tongue.

Double unguent box is decorated with seated images of king, solar disks and plumes. The flexible bracelet has sacred eye for protection.

Lamp of carved calcite, resembling Art Nouveau style, held flame in three lotus-shaped cups. Serpent god aids passage through the underworld.

ful woman in Egypt. Her husband being the somewhat deformed heretic Akhenaten, their marriage suggested beauty and the beast. This strange messiah, who tried to force his early approach to monotheism on his subjects, was possibly Tutankhamun's father, and certainly a close relative—perhaps a half brother. Tutankhamun lived during a period of palace revolutions, spiritual groping and about the brightest splendor the world had yet seen. From the riches in his tomb, meant to be enjoyed in his afterlife, it is clear that the young pharaoh did not expect to give up a single earthly pleasure.

In the years following the discovery of the treasure in 1922 in the Valley of the Kings south of Cairo, parts of it have been shown from time to time in several European cities (SMITHSONIAN, June 1972), in Tokyo, and also—in a very small exhibit—at the Smithsonian Institution in 1961. Now the largest selection ever



Squatting gold figurine, worn on chain, may be the young king Tutankhamun himself. Alabaster ibex had two real horns, but one has been lost.

sent out of Cairo will bow at the National Gallery of Art in Washington on November 15, and will remain there for four months. Then it will hit the road for two years, going on to the Field Museum of Natural History in Chicago, the New Orleans Museum of Art, the Los Angeles County Museum of Art, the Seattle Art Museum and, finally, the Metropolitan Museum of Art, which was the prime mover behind the exhibition (the Metropolitan's director, Thomas Hoving, spent 20 months in negotiations with the Egyptian Organization of Antiquities).

Art shows of this magnitude (55 objects, 20 of which have never been outside Egypt) seldom go to places as far-flung as New Orleans and Seattle, not because such cities lack proper facilities or have insufficient public interest, but because the cost of insurance is often prohibitive. In this case, insurance costs have been virtually eliminated under the new federal Arts and Artifacts Indemnity Act. The other costs of the tour are being met by grants from Exxon Corporation, the Robert Wood Johnson Jr. Charitable Trust and the National Endowment for the Humanities. Most of the proceeds from the sale, during the tour, of reproductions and publications will be used to help renovate the deteriorating Cairo Museum—the world's greatest storehouse of Egyptian art—with some earmarked for the Graeco-Roman Museum in Alexandria.

The treasure was sent to the United States by ship. Each major object, packed and boxed separately, was roped to a grilled metal deck so it could not shift or shake loose with the ship's motion. Two vessels of the U.S. Sixth Fleet, the *Milwaukee* and the *Sylvania,* transported the priceless cargo in the course of normal rotation home—without expense either to the taxpayer or to the Egyptian government.

Scholars concede that Tutankhamun's is "the richest royal tomb of antiquity ever found." Yet, since it

The pectoral of this splendid necklace symbolizes the moon's nocturnal journey across the sky in

a golden bark. The fringed cloisonné plaque at the top hung down wearer's back as a counterweight.

Pure gold mask, inlaid with blue glass, was placed over head and shoulders of Tutankhamun's mummy.

belonged to an obscure "boy king" who ruled only nine years (from about 1334 to 1325 B.C.), it has been assumed that mightier pharaohs must indeed have had richer tombs, although most of the evidence has long since vanished. Another school of thought proposes that the Tutankhamun treasure really was exceptional owing to the special circumstances of his reign.

Tutankhamun was more than a pharaoh. He was a milestone, a symbol of restored order after an interlude of chaos. Egypt had long been dominated by the vast priesthood of the state god Amun-Re. The priests profited from the spoils of Egypt's foreign conquests, and they shared power with the pharaohs. Then, under Amenophis III, the stage was set for the dwindling of the priests' power, and under his son, who became known as Akhenaten, disaster struck. Akhenaten had the effrontery to sponsor a universal sun god called Aten. With his stunning wife Nefertiti he abandoned the priestly stronghold at Thebes, sailed down the Nile to a site he called Akhetaten (later Tell el-Amarna), and built a new religious capital.

The priests were irate, and the rest of Egypt worried. Akhenaten's new temples were unusually sunny; he encouraged a less rigid form of art, and he dared to

have himself portrayed on monuments with his wife and children. But the populace hated to give up all their beloved gods, and when Akhenaten died, the reaction was inevitable. The priests recaptured their power, and the boy Tutankhamun became pharaoh. To many of his subjects, he represented a welcome return to "old times." For this reason, one modern scholar, Edward Wente of the University of Chicago's Oriental Institute, suggests that when Tutankhamun died at about the age of 18, his tomb may have been outfitted with extra elegance.

Whatever the case, the contents of the tomb are full of clues to Egyptian history, to Egyptian ways of life. Take the little alabaster unguent jar (p. 42). Its elaborate curly handles draw us back into early history. Represented in the handle are two long-stemmed flowers, the lotus of Upper Egypt and the papyrus plant of Lower Egypt. After a fierce battle, these two regions were united about 3000 B.C., and subsequently the flowers were often pictured with their stems knotted together as an emblem of peaceful unity.

The early Egyptian, like most of mankind, tried to protect himself against himself, against misfortune, and above all, against being destroyed by death. His gods, amulets and magic writings were all part of his protective equipment. Tutankhamun's mirror case (p. 42), was shaped like an ankh, an early form of cross with a loop at the top. A potent symbol of life, ankhs were seen everywhere. Today ankhs are back in fashion, having become a popular bangle.

Another ubiquitous emblem was the eye, which appears on a clasp on Tutankhamun's bracelet (p. 43). One of the holiest symbols of Egyptian religion, the eye at different periods was identified with the sun and moon. Both men and women used dark paints made of kohl to elongate their eyes, and tinted their eyelids—certainly not the only time that self-beautification and religious symbolism have overlapped.

The desire for cosmetics is evinced by the fact that Tutankhamun had some 50 vases for different unguents in his tomb, all of them emptied by robbers who made a quick raid on the tomb shortly after the burial and poured the precious stuff into waterskins for easy removal, presumably to be sold on the sly.

In some later civilizations, perfume was used to mask body odors. Not so among the Egyptians, who were almost compulsively clean, bathing two or three times a day. They did use special "fresheners" for armpits and groins, but applied perfume, it appears, mainly to enjoy its fragrance. Such luxuries, to be sure, were unfamiliar to workers and peasants, yet

Mr. Prideaux wrote on Preston Jones in October. He was co-author with Josephine Mayer of Never to Die: The Egyptians in their own words.

This child's chair, of ebony inlaid with ivory, was no doubt made for Tutankhamun as a boy. At left is a close-up of one of the gold-covered wooden panels that are set into the armrests.

The royal couple are depicted in idyllic scenes on this elaborate chest. The painted ivory panel (on back of box) shows the king shooting fish, as his wife waits to hand him an arrow.

Fifteen rings were in Tutankhamun's coffin,
but only two were actually placed on his fingers.

even among them standards of cleanliness were high.

The uses of tomb treasure were both magical and practical, with no sharp line between them. An example of double usefulness is Tutankhamun's ivory headrest (p.42-43), with two lions on its base and Shu, the god of air, holding up the curved head support. This would serve the king in a practical way in the afterworld—just as it did on Earth—but, also, since the human head was regarded as the seat of life, a headrest had a magical efficacy in the attempt to defy death. Almost every object in the tomb—the sacred cobras, the funerary bedstead in the form of two lions, the red-tongued lion unguent jar (p. 51)—offered some form of protection, although it does seem that the crouching ibex (p. 43), which is also an unguent jar, may have been meant only to delight the eye.

The small four-room sepulchre was stacked to the ceiling with a dazzling hodgepodge, not only objects of gold-trimmed furniture, gold statues, sumptuous jewelry and robes, but also homely useful things: enough seeds to plant a garden, a hand mill for grain, a forked stick for catching snakes, a fly whisk, boat paddles, leather sandals, arrows, bows, boomerangs, dried fruit and joints of beef and fowl.

Among Tutankhamun's treasures, a lock of reddish hair, such as one might keep in a locket, was found in a small gold box. An inscription identified the hair as belonging to Queen Teye, the principal wife of Amenophis III, who might also have been Tutankhamun's stepmother. What interests us about Tutankhamun's little keepsake is not so much its precise origin as the light it casts on his character. Although, with his coronation, he had joined the ranks of the great god-kings, he was not too much a god to be a sentimental human being.

Surpassing splendor in jewelry

Packed in another small box was a solid gold figure of a king suspended from a chain (p. 43). Again the identity is uncertain. But, despite its modest size, it reflects important history: the revolt against rigid art forms that was part of Akhenaten's rebellion. The king's squatting position and the natural folds of his attire are hallmarks of the new style in art that lingered on in Egypt after the rebellion was quashed.

Splendid jewelry has been created by many ancient peoples, including the Sumerians, the Scythians (SMITHSONIAN, April 1975) and the Greeks. But the Egyptians surpassed them all in superb craftsmanship, diversity of forms and colors, and in a cascade of productivity for more than 3,000 years. They had a peculiar affinity with jewelry. It was clear, bright and virtually imperishable, which is exactly what they themselves wanted to be.

The goddess Selket (also on p. 42) is seen here from three angles, guarding the shrine containing Tutankhamun's viscera. The scorpion on her head symbolizes her magic powers against its sting.

For adornment the Egyptians favored many forms of jeweled pectorals, particularly semicircular "collars" of the kind that rested flat on Tutankhamun's chest and looked something like a dickey or shirt front. Taking the form of a bird with open wings, they seemed to hold his royal shoulders in a feathery embrace. In style with his times, Tutankhamun also had a fine set of earrings, decorated with blue glass duck heads, and requiring pierced ear lobes.

Egyptian jewelers at the time used mainly semiprecious stones—amethyst, turquoise, lapis lazuli, and so on. But their artistry was so highly prized that grave robbers kept digging for centuries, and doubtless benefited by a curious little guidebook that circulated in their trade, *Book of Buried Beads and Precious Treasures.*

The crafts that went into making fine jewelry were also useful in the making of furniture, weapons, coffins and other religious articles, with the result that many of the larger treasures in Tutankhamun's tomb seem an extension of the jeweler's art. A notable example is his famous pure gold mummy's mask (p. 45), striped with blue glass and gleaming with inlaid bits of carnelian, green feldspar and lapis lazuli. It seems no exaggeration to call it super jewelry.

Once Tutankhamun's tomb was honorably discovered and consigned to the gentle care of the archaeologists, a series of odd circumstances created an impression that there was an ancient curse on any and all invaders of the king's resting place. Lord Carnarvon, who, with Howard Carter, made the first modern entry of the tomb, died six weeks later in Cairo after he contracted a blood infection from a mosquito bite, which, in turn, was followed by pneumonia. His death came in the middle of the night, and as he drew his final breath, the entire city of Cairo blacked out due to an unexplained power failure, and at the same instant Carnarvon's dog back in England gave a weird howl and died, too.

A few other strange events supported the "curse" theory. But it seems just as easy to build a case around the premise that the tomb had been blessed by extraordinary good luck.

The first stroke of luck, so to speak, was Tutankhamun's sudden death at the age of 18. Normally, tombs were prepared well in advance for royal tenants. But nothing was booked for the boy king, so he was buried in a relatively small tomb that stood ready for an aging vizier named Ay, who had probably served as a co-regent with Tutankhamun. This modest layout, though subjected to a couple of minor breakins, was apparently not conspicuous enough to tempt serious grave robbers. Luckily again, almost 200 years later, when Rameses VI's tomb was dug almost next door, the site was covered by workers' huts that eventually fell to rubble, and much of the excavated dirt was dumped in front of Tutankhamun's tomb.

All traces of the tomb vanished until 1907, when a few pieces of gold leaf embossed with Tutankhamun's name turned up in a small underground chamber, and a faience pitcher, also bearing his name, was found under a boulder. Then some jars were found containing bags of chaff, natron (a mineral), and some bird and animal bones. Later they were identified by Her-

bert Winlock of the Metropolitan Museum as materials used to embalm Tutankhamun, and vestiges of his funeral banquet. Here were the clues, but where was the body?

The actual discovery must be credited to a young British archaeologist, Howard Carter, who dug up and sifted 200,000 tons of the floor of the Valley of the Kings for seven years. He purposely avoided the pathway leading to Rameses VI's tomb, in order not to bother the streams of tourists. In an off-season, however, Carter began to dig near the path and hit a flight of stairs leading down to a sealed doorway. This had to be Tutankhamun's tomb, there was hardly any other possibility. From evidence on the seals, he was certain that the tomb had not been penetrated for more than 3,000 years.

He cabled his British patron, Lord Carnarvon, that he was on the edge of "a wonderful discovery" and would stop work until they could open the tomb together. Carnarvon hurried to Luxor and on November 26, 1922, the two men began to uncover the treasure that astonished the world.

Here again, the timing was lucky. Had the discovery happened, say, a century earlier, there would have been far less scientific knowledge to apply to the care and analysis of the treasure, and probably less cooperation among the archaeologists. The Egyptian government put at their disposal an empty tomb, once occupied by the Pharaoh Sety II, for use as a laboratory and workshop. Top specialists from the United States and Britain, as well as Egypt, assembled there to help decipher inscriptions and clean, repair, photograph and catalog the find. Carter refused to rush into all four rooms of the tomb, but gave attention to each separate object before proceeding to the next. It took him two months more to reach the climax of his discovery, Tutankhamun's coffin in the burial room.

Toting the treasure some five miles from the tomb to a steamer on the Nile could not be entrusted to camels, nor was the little road smooth enough to insure a jolt-free haul by truck. The problem was solved with special cars that ran on a portable stretch of railroad track. The track had to be lifted up and laid down "ahead of itself" many times, which was a painful labor when the rails were sizzling hot under the desert sun. But the cargo reached Cairo.

All that finally mattered was that the treasure, in every stage, had been wonderfully well-treated, better than it could have been at any previous time.

The chain of events that extended across the centuries gives us today the impression that Tutankhamun was destined to survive in human memory. But there were probably times when his close friends —his wife, the vizier Ay and perhaps Nefertiti—feared that he lacked the stature to loom importantly on Earth. For one thing, wasn't he too obliging? He certified his sympathy with the Amun-Re priesthood at Thebes by changing the last two syllables of his name from Tutankhaten to Tutankhamun. He ordered that work on half-finished temples to Amun-Re, work that had been rudely halted by Akhenaten, be resumed. And in what may have been an effort to advertise his far-reaching goodwill, he traveled up and down the Nile, and he also established his administrative center at Memphis.

In his tomb, then, it was not surprising to find the small wooden figure of Ptah, the principal god of Memphis (see cover). Below a blue skullcap, his body is wrapped in a garment of feathers, and he holds a scepter topped with an animal head and the symbols for life and stability. Widely revered as patron of artisans and artists, Ptah was sometimes called "Architect of the Universe."

As his friends may have feared, Tutankhamun did not loom importantly in his nation's government, nor did his mollifying policies do him any lasting good. Shortly after his death—from causes unknown—Egypt fell under the rule of a military commander, Horemheb, who saw fit to call Tutankhamun and the rest of his "Amarna family" heretics. Their names were obliterated and Tutankhamun was reduced to a non-pharaoh, a non-god. The boy king, however, has proceeded to win another and probably more congenial sort of fame. By association with his treasure, he has become, in effect, the foremost cultural ambassador of ancient Egypt.

The god Bes, usually depicted as a lion, was associated with pleasure—and so leonine forms were often used for unguent jars, as in this mischievous example.

By Richard T. Griffin

Sin-drenched revels at the infamous First Ward Ball

Chicago's political underworld jammed the Coliseum for an annual orgy that paid bills for Bathhouse and Hinky Dink

Bathed, shaved and perfumed, John Joseph Coughlin donned what he called his green dress suit. First came lavender trousers, with enough material to cover a pool table but tailored faultlessly to his massive frame. Over the white dress shirt he slipped on a white waistcoat brocaded with red rosebuds and pink carnations. Then came the green swallowtail coat, an enormous garment with deeply forked tails. It made him look even taller than six-feet-three and it helped slim him. He slipped his thick fingers into a delicate pair of pink gloves, his feet into yellow pumps, placed a high silk hat on his gray pompadour, brushed down the ends of his moustache and pirouetted before the mirror.

Many years earlier, fire had wiped out his father's grocery store and young John had had to pitch in to help support the family. He counted that a happy

Bathhouse and Hinky Dink dance a *bal poudré* in 1903 Chicago cartoon of the First Ward Ball. "First Search" McNally slips on waxed floor as two other rascals ape noblemen.

event. "If not for that bonfire," he would say, "I might have been a rich man's son and gone to Yale and never amounted to nothing!" He amounted to something now. He was "Bathhouse" John Coughlin and he was going to the First Ward Ball.

As guests converged on Chicago's mammoth Coliseum, Bathhouse John stationed himself near the door to welcome them. His huge expanse of chest swelled with pride as hundreds of his friends arrived, most of them in carriages but a few in shiny, sputtering motorcars. As the affair was both fancy dress and masquerade, many guests wore masks and elaborate costumes.

Mayor Carter Harrison arrived and Bathhouse beamed, for he expected "Our Carter" to become President of the United States someday. The sheriff of Cook County paraded in, followed by a delegation from the Joliet City Council. There weren't enough Republicans around to fill a clay pipe.

The guests swarmed into the vast hall and engulfed the five bars. Waiters took orders for champagne or beer, by quarts or case, as the band played. Empty bottles soon littered floor and tables and blue clouds of cigar smoke hung near the ceiling. A few dozen couples swayed on the dance floor, but most of the men simply talked and waited.

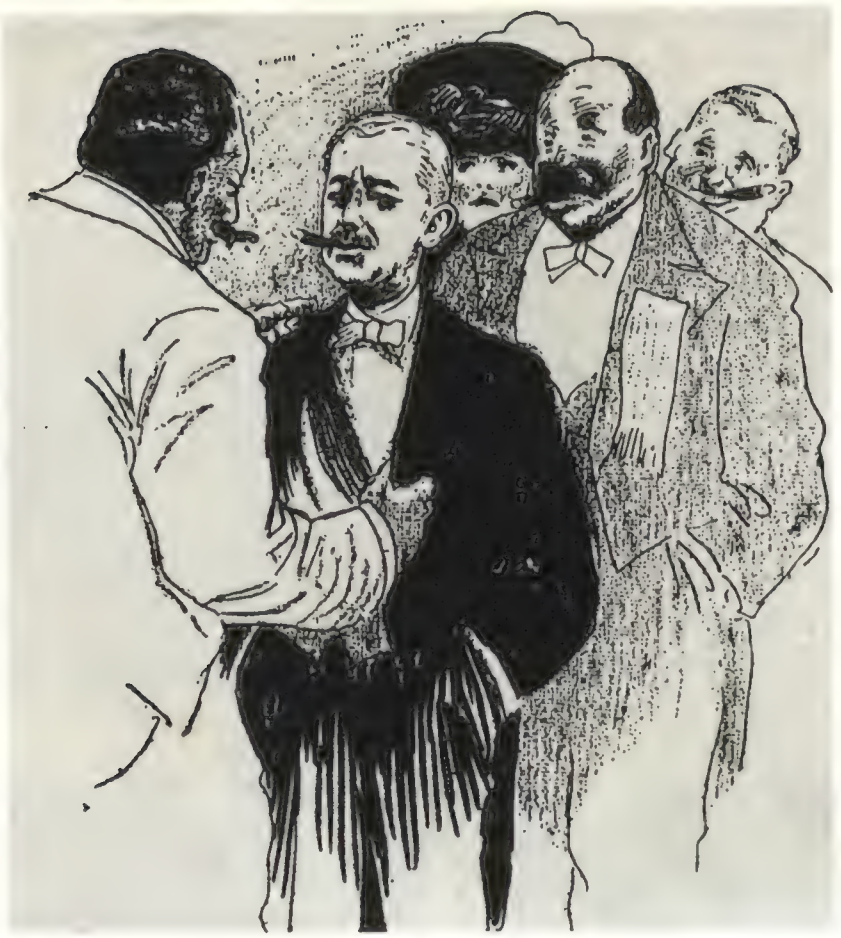
At midnight a team of matched bays clip-clopped on the bricks of Wabash Avenue and jerked to a stop at the entrance to the Coliseum. Shouts of "They're here!" filled the auditorium as Minna and Ada Everleigh alighted from their brougham and entered the hall, dazzling in silks and diamonds. The queens of the ball had arrived! The band struck up their favorite (though not entirely apt) song, *Stay in Your Own Back Yard,* and the Everleigh sisters swept regally to their private box. After them arrived squads of women, smiling and nodding at cheers from the men. Now, thought Bathhouse, the ball can begin in earnest.

"Clear the dance floor!" Instantly, dozens of burly ushers charged onto the floor and the dancers scurried to the sidelines. There was a flourish from the band and 2,000 men and women rose from the crowded tables and boxes and made their way to the dance floor. Bathhouse, surrounded by policemen and an army of ushers, fought his way to the head of the crowd, while 10,000 other guests watched from the sidelines.

"On with the march!" Bathhouse cried happily. The band struck up a rousing tune, and the fabled grand march began. Two of Bathhouse's lieutenants each led a regiment of marchers. One was "First Search" McNally, a deft-fingered deputy coroner who had become rich by being the first official to reach the scene of most of Chicago's sudden deaths. The other was Joseph "Yellow Kid" Weil, who would gain later fame as one of the world's finest confidence men.

On they came, marching, strolling, staggering, painted, rouged, masked, packed and perspiring despite the crisp December wind outdoors. On they came, thousands of the First Ward's blackmailers, burglars, pickpockets, horse thieves (studying the new trade of auto theft), gamblers, madams, prostitutes and their cadets (now called pimps), sluggers, swindlers and saloonkeepers, marching arm in arm with the very policemen assigned to guard the guests from thefts and assaults, as well as police officials, state legislators and judges. On they came, 30 times back and forth the length of the enormous hall, with Bathhouse John marching backwards, his arms upraised like a drum

Richard T. Griffin is the business news columnist and former financial editor of Chicago's Daily News. *His grandfather was a key Hinky Dink lieutenant.*



Suitably beribboned, Hinky Dink talks with his henchmen as champagne flows and money pours in.

major's and issuing orders to his followers, until everybody tired of the spectacle and marchers started stumbling and cried out to Bathhouse, "Stop it, Jawn!"

The most important event of the year was over for Bathhouse, an event when he could strut and give commands and wear his billiard green dress suit and high silk hat. But the First Ward Ball itself was only beginning. No longer were the visiting "respectables" merely scouting the newest inmates of the Everleigh sisters' extravagant emporium and the lesser whorehouses of the city. A quart or two of champagne washed away the thin layer of genteel manners. Fights erupted and crowds formed to watch, until coppers burst through and expertly dispatched the combatants with a blackjack at the base of the skull. Female impersonators performed impromptu acts. Card sharks clipped the gullible in a few shuffles, while pickpockets reverted to nature. Prostitutes flaunted their wares and occasional screams from various parts of the building could be heard. Finally, daylight streamed in and the survivors struggled home.

While Bathhouse John preened and pranced, a pale little man worked diligently in a corner of the Coliseum. He wore a dark suit, baggy but neat, and was seldom without a thick Havana clenched between his teeth. He always looked as though his best friend had just died. Almost a foot shorter than Bathhouse, and never more than 100 pounds heavy, he was all cunning. While the Bath played, the little fellow counted. He was christened Michael Kenna, and like Bathhouse was a Chicago alderman. The nation would learn to know him as "Hinky Dink."

Privately, he told cronies that the ball "ain't decent, but this is Jawn's show." However, Jawn's show had become a money machine for Bathhouse John and Hinky Dink, and decency couldn't compete with the many thousands of dollars that rolled in every winter while the balls lasted. The money financed the election campaigns of this pair of rogues, greasing their small but powerful political machine of the bad old days. Thanks in part to the ball, Bathhouse and Hinky Dink could get judges hired and fired, transfer favorite policemen to their ward, and handpick representatives.

From the 1890s until Al Capone muscled them out of power in the 1920s, Bathhouse John and Hinky Dink were the absolute rulers of downtown Chicago, dukes of the First Ward and lords of the Levee. Their ward was Jekyll and Hyde stuck together like Siamese twins. The north half of the First Ward was one of the richest square miles in the world, embracing the Loop, giant department stores, some of the nation's biggest banks and corporate enterprises, as well as a fine opera company, symphony orchestra, theaters and museums. Bathhouse John—so named because he once worked as a rubber in a Turkish bath—boasted that he represented more millionaires than any other politician he knew. His was the Jekyll half, culture and corporations.

The south end of the ward was the Hyde half, dark and dangerous. It was jammed with saloons selling cheap whiskey, sometimes laced with knockout drops; with gambling houses where anything went, and that usually meant the customer's money and sometimes his life; and with brothels where fees started at ten cents and white slavers kidnapped girls as young as 13. Here were "museums of anatomy," with full-size statues of

Two doughty aldermen, properly Michael Kenna and John Joseph Coughlin, attend a ward function.

Massive Bathhouse plays to the hilt his cherished role as Grand Marshal of the First Ward Ball.

men and women grotesquely deformed by venereal diseases and gangrene, and penny arcades, poolrooms and storefront sideshows.

The worst saloons and gambling houses and most of the bagnios were confined to three-quarters of a square mile at the far south end of the ward, in a district called the Levee, Chicago's tenderloin, one of the largest red-light districts the world had ever seen. The ward also included skid row, where thousands of bums slept in fleabag hotels and lived off handouts. Free lunches at the two saloons owned by Hinky Dink kept many of them alive, and at election time the aldermen imported panhandlers by the trainload from other cities and put them up. Each bum represented half a dozen more votes to the First Ward rulers, whose motto was "Vote early and often."

Puritanical in their private lives, the Bath and the Dink let it be known that they never set foot in any of the unsavory houses that flourished under their political protection; but the money poured in because their bagmen made weekly rounds to each of the houses, then redistributed the loot to coppers, judges and legislators. It provided a good living for the aldermen, too. When the Dink died in 1946, childless, he left almost a million dollars to his nieces and nephews, who refused to fulfill his last request that some of the money be used to build a modest monument on his grave. Bathhouse died broke, but he had a wonderful time spending it on his racehorses (born losers) and on a full-fledged zoo he built on the grounds of his handsome vacation home in Colorado.

Coughlin's association with a crippled piano and violin player in Carrie Watson's high-class, 60-girl "parlor house" led to the idea of a First Ward Ball, although Lame Jimmy can't be held responsible for its becoming the most notorious orgy in the city's history. For 15 years in the 1880s and 1890s, the curiously sentimental people of the Levee put on finery and attended an annual benefit party for Lame Jimmy. It was an occasion, as Carrie Watson said, when joy "reigned unrefined." The bacchanals ended when a drunken policeman shot a fellow officer at one of the parties, and public outrage finally forced the police department to shut down the event for good.

Bathhouse John mourned the passing of Lame Jimmy's benefits. Sitting one day in Hinky Dink's saloon, the obvious idea took hold, and the First Ward Ball was born: not a small, family affair for three or four hundred like Jimmy's parties, but an event open to the public, in a large public hall, with tickets allotted, according to income, to every political dependent from the newest copper and youngest prostitute to the biggest and most prosperous operators in the ward.

Brewers, distillers and wine merchants quickly offered the aldermen large amounts of booze at cut-rate prices and granted unlimited credit. Hink and the

Bath dispatched hucksters with satchels full of tickets to every tarnished business in the ward.

At first the ball was strictly a south-end-of-the-ward frolic. But as it gained notoriety with each passing year, supposedly respectable men from the upper world began coming. Since they could wear masks, they could conceal, and sometimes improve, their identity, examine the new girls of the brothel owners and make mental notes for future excursions.

Everybody agreed that the tenth ball, in 1907, was the best of the lot. Of the evening, the *Tribune* wrote: "If a great disaster had befallen the Coliseum last night there would not have been a second story worker, a dip or plug ugly, porch climber, dope fiend or scarlet woman remaining in Chicago." Even Hinky Dink found reason to smile at the profits: reportedly between $30,000 and $40,000, almost twice as much as ever before.

Hinky Dink invites reformers

But Hinky Dink, who didn't make many mistakes, made one when he invited a minister to attend the ball. The minister was appalled, and began sermonizing about the lurid events. By the autumn of 1908, his description of lewd circus acts and a hatpin stabbing had recruited church groups and women's clubs, who condemned the affair and called on officials to ban it.

The reformers decided to block the liquor license. They appealed to the mayor, the chief of police and every alderman (except two)—without success. They wrote letters to the newspapers, held rallies, gave speeches and issued ultimatums. They went to court and the judge threw them out.

"As far as we have learned," thundered Arthur Burrage Farwell, president of the Chicago Law and Order League, "there is no legal means of stopping the ball. However, there are other strings to our bow."

"All right, we'll compromise," sneered Bathhouse John. "We won't let parents bring their children. There!" He chuckled and offered the reformers two boxes at the ball. "Let 'em come around and see a first-class gathering of good fellows."

Hinky Dink reluctantly agreed, less sure than his pal that it was a good idea to let the reformers in. "I ain't got any grouch against preachers," he said. "They're all right in their place. I know some preachers who are mighty decent men. But whenever you hear one of them fellows shout that Hinky Dink is a menace to society, keep your hand on your watch." He was also less than charmed by the Prohibition forces, even though his wife had just led the grand march at the annual hop of the Illinois Temperance Cadets.

To give the 11th ball "tone," Bathhouse told the bouncers, ushers and floor managers that everybody

At tables, the seamiest citizens of the Levee, Chicago's raunchy tenderloin, drink and fight.

By early morning, the Coliseum overflows with thousands of shouting, staggering drunks.

had to wear a full-dress suit. Waiters were informed they would have to buy a tray and a towel from the aldermen before they could work at the ball.

Attending an evening meeting of the City Council just before the ball was to start, Bathhouse John was draped to the chin in greatcoat and muffler, but his colleagues demanded that he reveal his garb. The Bath threw open his coat and the aldermen gasped at his daring. He was dressed as somberly as an undertaker in immaculately tailored black trousers, dress coat and pumps. The only brightness came from a lavender cravat and a red shash across his chest emblazoned "Grand Marshall."

The next day the outraged and horrified *Chicago Record-Herald* headlined: "VICE DEFIES DECENCY . . . First Ward Ball Repeats Annual Revolting Scenes of Shameless Sin."

Nothing like it had been seen in Chicago, even by hardened observers of past debauches. Lunacy reigned from the moment Bathhouse and Hinky Dink flung open the great doors and 15,000 unruly and impatient men and women, who had brought traffic to a standstill, surged into the Coliseum. They swept aside 100 uniformed policemen, whose swinging clubs failed to control them. One hundred and fifty husky ushers with greasy hair and dress suits bellowed, swore, threatened, punched and shoved, but were overwhelmed. Waiters

A "Green Parlor" bedroom in the extravagant bordello run by Chicago's famed Everleigh sisters.

stood by helplessly as champagne and beer were seized from their trays by unknown hands. Bartenders served up free drinks, under threat of death. Sturdy two-by-four railings around boxes were smashed and splintered, and a 35-foot bar was destroyed. Women fainted in the crush of fetid bodies and were passed hand over hand to the door with the yell, "Gangway, dame fainted!" All doors except the main one were barred and locked, and hundreds of the unfortunates inside struggled to get out to catch their breath. Dancing was impossible in the squirming, struggling mass of humanity, and drunks who passed out remained propped up by the crush.

By ten o'clock authorities managed to bring some sort of order to the place, and the waiters and bartenders—much to the relief of the Bath and Dink—were able to start collecting cash for drinks, which the aldermen had gotten free from the ward's liquor interests.

Women in slit skirts, bloomers, peekaboo waists and picture hats, spangled with gems and pearls, furs draped over their naked shoulders and five-cent masks hiding their paint-caked faces, laughed and drank and swayed against men squirming uncomfortably in formal evening dress.

A tall woman dressed as a little boy carried a sand shovel and tin pail and wheedled guests into filling it with champagne. A pudgy blonde in diamonds and flowing feathers passed out, while another climbed on a table and started orating to nobody in particular. One magdalen costumed as a nun two-stepped on the dance floor. Some women were dressed as jockeys, clowns and page boys, and many wore nothing but bathing suits, which one scandalized observer called mighty little suit of any kind.

Arthur Burrage Farwell, accompanied by eight members of his Law and Order League, was horrified. He said there were at least six fights in progress in his

Mayor Carter H. Harrison II ("Our Carter") and his wife. The city machine owned him.

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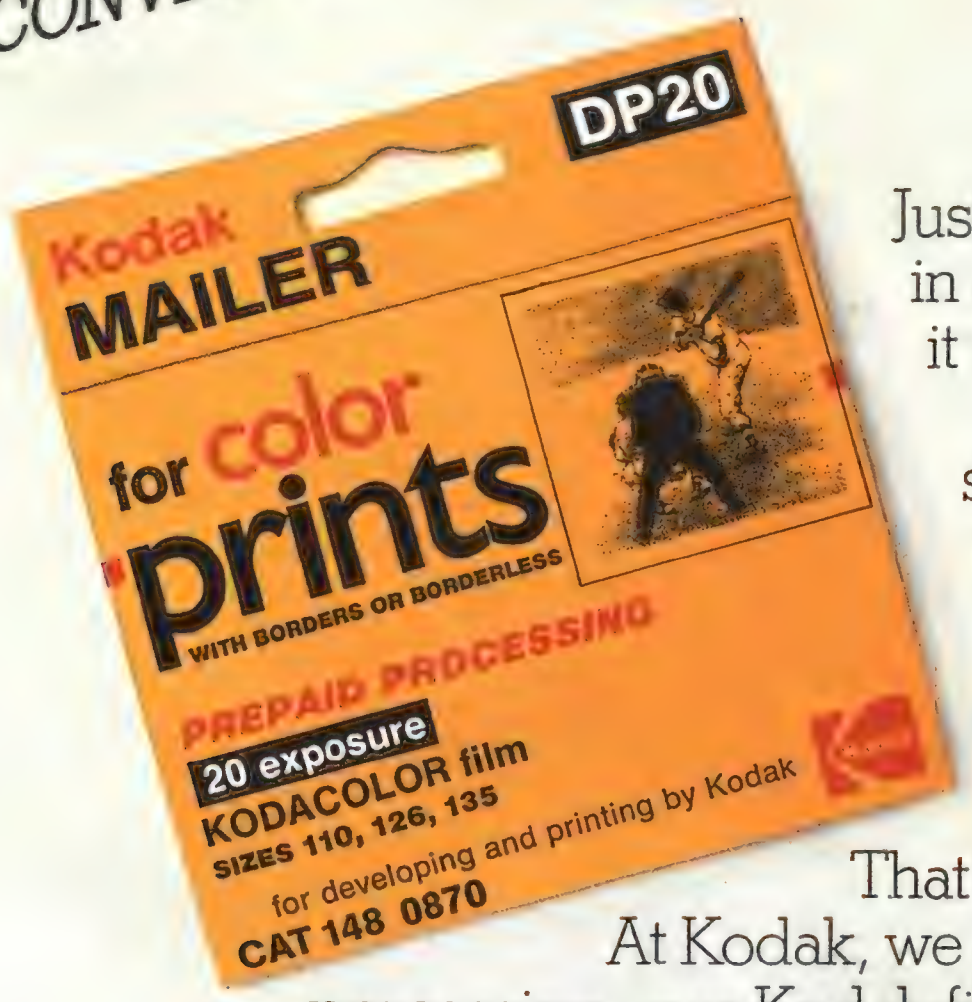

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view at any given time, and once he saw Bathhouse about to throw a bottle at somebody, when a friend restrained him. When Bathhouse grabbed a chair and tried to toss it, several of his friends pounced on him and led him away. Later, he and some aides beat up a newspaper photographer and his assistant who were preparing to photograph guests.

"The crowd fought like wild beasts and the women swore as loudly as the men," Farwell said. "I doubt if any city in the world at any time ever permitted such a disgraceful orgy to be carried on."

In the adjoining box, one Dean Sumner of the Cathedral of SS. Peter and Paul sat under the protection of two police sergeants and a police lieutenant. He recoiled in shock when a young woman approached his box and invited him to bed. Bathhouse, recovered from his battles, stopped by and offered to introduce his lady friends to Dean Sumner, who paled and declined the offer. Hinky Dink offered the Dean drinks and cigars.

Promptly at midnight, one of the bands played a fanfare and thousands streamed onto the dance floor. Bathhouse John swept to the head of the parade, with an exquisitely dressed Everleigh sister on each arm. The band struck up the evening's theme: *Hail, hail, the gang's all here!* The grand march started and the mob swept past, 25 abreast, a Who's Who of thugdom —every minor crook in Chicago who was out of jail at the moment, plug-uglies, thieves, dips, safecrackers, prizefighters, gamblers, mountebanks, bouncers, bartenders, female impersonators, strumpets, bums and dope addicts—all marching arm in arm with police court lawyers, theater personalities, college students and curiosity seekers.

All pretense of respectability drowned in the sea of champagne and beer. A drunken young boy lurched against a box and started talking to a woman, and a man slugged the lad in the stomach, hurling him to the ground, stunned. Men clawed at expensively gowned women, who jabbed at them with deadly hatpins. A woman protested in vain as a man stripped her dress from her body.

A wilted Bathhouse finally told the band leader, "Give them two choruses of *Home, Sweet Home,*" and the carousers who could still stand stumbled out into the cold, gray dawn, where newsboys were hawking their first editions. Somebody smashed the alarm box at the Coliseum's entrance and a dozen fire engines raced to the building.

The aldermen were disappointed with the receipts. The big-spending businessmen who came in years past had been frightened away, and the pair made less than $20,000. One person was jailed for his behavior at the ball. He had tried to sneak in without buying a ticket.

Dean Sumner fumed that "It was an everlasting disgrace to Chicago. It was the most disgusting spectacle I ever witnessed and as disgusting as anything I ever heard of. . . ."

The shrewd Hinky Dink knew the jig was up. The city was changing. Some important fellow Democrats were beginning to doubt the wisdom of flaunting the organization's connections with criminals. And newspapers and reform groups were spawning a true citizens' protest. The following year, Kenna tried for one more time—and was hit from every side. Finally he canceled the ball and scheduled a concert instead.

"No Ball, That's all," crowed the *Tribune.* Arthur Burrage Farwell invited Hink and the Bath to join the Law and Order League; but they declined the honor. Two hundred waiters who had paid five dollars each for the privilege of serving booze at the twelfth annual ball stormed Bathhouse's office, demanding refunds. He told them to beat it.

On the evening of the First Ward's concert, it was obvious that the mayor had fallen in with the reformers. More than 200 policemen patrolled the Coliseum, inside and out, while a brigade of mounted policemen lined Wabash Avenue. The chief of police laid down the rules: no liquor, no smoking, no dancing, no standing around, no swearing, no masquerade costumes, no short skirts; the hall must be emptied by midnight.

Only a thousand of the faithful had showed by 8:30 and the ticket seller dozed off in his booth. The concert ended by 11, and Hink's lieutenant, Johnny Griffin, told the Bath that they had lost money.

"We were stung," Bathhouse John said, later. And Hinky Dink agreed.

Like one of the furies of the French Revolution,
a plastered prostitute screams abuse from a tabletop.

By John Keegan

Men of the ranks, not generals, decided the issue

What actually happens in the confusion and chaos of warfare is an elusive question to pin down—try Agincourt, for example

The itch to know what actually happens on a battlefield does not afflict everyone. But it afflicts some, and I am one of them. The reason, I suppose, is not far to seek: I spend my life teaching military history to officer cadets at the Royal Military College at Sandhurst, but under the disadvantage of never having been a soldier and with the suspicion, which has grown stronger over the years, that the history books tell less than the complete truth on the subject of battle.

Most history books concentrate on the doings of the commander and on the methods by which he operated. These might be called the decisive battle books, for the first and most important of this now predominant genre, which appeared in 1851, was Sir Edward Shepherd Creasy's *The Fifteen Decisive Battles of the World from Marathon to Waterloo.* It became a Victorian best seller, and deservedly so, for it was a fascinating book and remains immensely readable. But its success in the English-speaking world has stunted the growth of an alternative and, to my way of thinking, far more valuable sort of book: that which takes the "point of maximum danger" as its starting place and the front-line soldier as its central figure.

It is not out of mere craving for sensation that I take this view but from the recognition, which a very little thoughtful reading will bring, that while some generals in some battles have undoubtedly been able to influence what transpires at the point of maximum danger, other generals in other battles have not; and that indeed there have been protracted wars—the First World War is the most obvious example—in which generals were virtually powerless, despite various actions, to alter the course of the fighting in any way. The fighting nevertheless persisted.

What, I set myself to asking, sustained it?

It was not, I discovered, a particularly novel question. At least two talented writers, one French, one American, had devoted their careers to answering it: Charles J.J.J. Ardant du Picq and S.L.A. Marshall. The first, an officer in the army of Napoleon III, published only one work, which was inexplicably over-

The field at Agincourt, with all the romantic paraphernalia of the time: armor, lances, archers,

Adapted from his book, The Face of Battle, *© 1976 by John Keegan; this November publication of Viking/ Penguin is December Book of the Month selection.*

banners and blood. The illustration appears in the illuminated *St. Albans Chronicle*, c. 1450.

The effective crossbow followed the longbow and appeared in film *Henry V*, 500 years after Agincourt.

looked for many years. The second, a brigadier general in World War II, has published many, which have made him, justifiably, one of the best-known and most influential military writers of this century. But they have this in common. They believe that what goes on in battle is best explained not in terms of what the commander orders, but in the pattern of threats and inducements which military society and the battlefield environment impose upon the common soldier. Both believe strongly in the motivating force of what may best be defined as "Honor," particularly in the context of the small military group.

Marshall put it most starkly: "When a soldier is known to the men who are around him, he has reason to fear losing the one thing he is likely to value more than life—his reputation as a man among other men."

But is Honor a sufficient explanation of why men fight? In my uncertainty it seemed best to examine a variety of battles, fought at different moments in history and for which adequate eyewitness testimony existed, to try out the concept of Honor and to look for additional or different sources of the "will to combat." What role might coercion play? Or hope of plunder? And what of such new and sophisticated ethological concepts as territoriality—the idea that all animal, and therefore perhaps human, conflict is essentially about title, real or imaginary, to land?

Agincourt seemed a good battle to start with, for a variety of reasons; it belonged to an age when Honor was explicitly extolled as the principal military virtue.

The Victoria and Albert Museum, London

It was short, and clear-cut in result. It was well documented—for a medieval battle, remarkably well documented. Above all, it was the sort of battle that brought men together face to face and confronted them inescapably with the facts of organized killing. How they behaved ought to provide some clues about the nature of battle.

The bare outlines of Agincourt, and of the campaign which preceded it, are quickly related. Henry V, King of England, landed in Normandy in the summer of 1415 with a view to recovering the lands lost to the French earlier in the Hundred Years' War. For the first seven weeks of his invasion, he laid siege to Harfleur, but when it fell he found that he had too little of the campaigning season left to march on either Paris or Bordeaux, the English "capital" in France. Wishing nevertheless to demonstrate his presence in the lands to which he laid claim, he decided to reembark not at Harfleur, but at Calais, 120 miles to the northeast. The French, however, had by this time assembled a large army with which they marched to intercept him, forcing him onto a more circuitous route than he had planned to take, scorching the country in his path, and eventually barring it near the village of Agincourt, just short of Calais itself.

The English were tired, hungry and outnumbered by 25,000 to 7,000, but, rather than surrender and pay ransom, Henry decided to fight.

After a night spent in prayer and preparation, his army took its ground the following morning opposite the French. They, forming three lines, were almost all dismounted knights, with some horsemen on the flanks. Henry's men were mainly non-noble archers, formed in a single line, with his armored knights sandwiched in three blocs between them. The flanks of both armies rested on woods, which lined the battlefield on both sides. Henry's front was protected with sharpened stakes which the archers had brought along.

For four hours the armies stood, about a thousand yards apart, until Henry decided he could wait for battle no longer. He advanced his line to within bowshot, say 200 yards, and, after the stakes had been replaced, ordered the archers to loose their shafts. This provocation brought down a French cavalry charge which the stakes and the arrows turned back, only for the horsemen to run into the first line of their own dismounted men-at-arms who had chosen that moment to advance. Thoroughly shaken, the first line pressed on, massing to concentrate against the English armored soldiers. Their impetus carried them some little way into the English line, but the English recovered, and were soon joined in the hand-to-hand fight by their own archers, who risked running forward from the shelter of their stakes to attack the enemy flanks. Very shortly the head of the French army was enveloped, the men in the center of the mass being too tight-pressed to move, and those on the outside being pressed against them by the ferocity of the English onslaught. At that moment, the French second line advanced to join in the fighting, but only succeeded in jamming the French first line more firmly in its place. It was some time before they gave ground, thus releasing the survivors of the first line from virtual imprisonment, and both together returned to their original positions.

So badly had the first line suffered in those few minutes of fighting that the chroniclers speak of the English standing on "a wall of French dead."

The French third line, of mounted men, now made signs of intervening: a small party under the Duke of Brabant actually charged but was repulsed; and a gaggle of peasants under the local squire attacked the English baggage park. Henry, to the outrage of his own men, who had just made potential fortunes in ransom money, therefore ordered the prisoners, whom he feared might rejoin the fighting, to be killed. When their captors refused, he detailed 200 archers to do the work. After some had been killed, the remaining French drew off and Henry realized that, against all the odds, he had won. The English had lost only a few hundred dead, the French about six thousand. Next day, the English crossed the battlefield and reembarked at Calais, taking 2,000 of the most valuable prisoners with them.

Victory: a balance of deaths

How had so few managed to kill so many (which is the central question, since the victory was the outcome of a balance of deaths)? One supposition might be that many of the dead were prisoners whom Henry had had slaughtered during the closing stage of the battle. But this is unlikely. Their captors had been reluctant executioners, and eventually he had had to detail a special execution party, under a trusted subordinate, to start the work. Even then it is unlikely that many were killed. They were still wearing their body armor and can scarcely have been prepared to cooperate in their own extinction, least of all at the hands of social inferiors like the archers, whom they certainly outnumbered by at least ten to one, and must therefore have been very difficult to do away with. The "killing of the prisoners" is indeed probably best understood as an extraordinary attempt by Henry to terrorize into sub-

You can almost hear the battle in this page from a decorated manuscript, so vibrant and colorful is the action. In it Henry leads his men into battle as the French flee.

mission a large party of the enemy who, standing on ground covered by a jetsam of discarded weapons, threatened to attack the English from the rear at a moment when their comrades seemed to be preparing a final assault from the front.

Might many of them have been cavalrymen, unhorsed in the opening charge? Some of the horsemen were indeed brought down, though probably not by the famous line of stakes with which the archers had barricaded their front: a horse's instinct for self-preservation is as strong as a man's and it will not gallop, or even walk, into an obstacle. It is also unlikely that many were killed by arrows, the horse's great body bulk, about ten times that of a man's, generally defeating the lethality even of the cloth yard shaft, which was 37 inches long.

I myself witnessed a bizarre incident at a military parade when a horse fell upon its rider's sword, which penetrated it to the hilt, yet got up and galloped for half a mile before it was caught and humanely destroyed. Woundings of that sort were probably the common outcome of the archers' volleying into the ranks of the charging French cavalry.

The result was that some of the riders would have swerved off from the threat into the woods which lined the battlefield (and thereupon said goodbye to it for the day), a few would have gone down with their mounts, and brought down those following at their heels, but the majority would have turned, or been turned by, their mounts, wounded or unwounded, and crashed back the way they had come.

It was this return charge by the cavalry which caused the French their first setback. They had intended originally not to attack at all but to let hunger and cold induce the English to surrender. Henry's long-range archery volleys had provoked them, as he had hoped, into changing their minds and advancing, but they still expected a walkaway victory. The collision of their own cavalry, however, with their advancing infantrymen threw their first line, at its left and right, into confusion and narrowed the front on which they could deliver their attack. Instead of overlapping the position of the English men-at-arms, their social equals, in the center of the English line, the French proceeded to meet them in a column of about equal width and, in the initial exchange of handstrokes, lost their advantage of numbers.

They ought soon to have regained it, as pressure of numbers from the rear expanded the head of the column to fill the whole space—only about a thousand yards—between the woods, into which about 8,000 of them were now crowding. The English archers, however, had seized the opportunity presented by the return cavalry charge and had left the shelter of their stakes to run forward and attack its victims—the unhorsed cavalrymen and the infantrymen whom their runaway mounts had bowled over. In this way the French column, instead of overlapping the position of the English men-at-arms, would itself have been overlapped and have been quite quickly outflanked around its head.

A parlous predicament

What happened next is graphically described for us by the chroniclers.

Assaulted by the English on three sides, the Frenchmen at the head of the column started to go down in numbers. And once a few were down, the predicament of all in the front line became extremely parlous. Pressure from the rear, exerted by the majority who could not see what was happening but hoped for a chance to join in, drove those in front inexorably into the weapon strokes of the English. The bodies of their comrades who had fallen acted either to trip them up, if they stepped forward, or, if they then stepped back for room to defend themselves, as a stumbling block to their heels. A tumbling effect was thus set up along the face and flanks of the French column, which quickly became cumulative, until the mass of recumbent bodies grew so large that not even the pushing from the rear could impel any more of the French into the killing zone. The building of these "walls of dead"—though some probably would have been still living—was remarked upon by all the chroniclers and effectively brought the infantry combat stage of the battle to a close.

This infantry combat was also the main action of the battle. Had it therefore brought about the majority of deaths in the French ranks? The answer is yes, almost certainly—with the proviso that a sizable proportion of those deaths were caused indirectly

Mansell Collection, London

Henry conducts thanksgiving service after battle; his 7,000 men had defeated French horde of 25,000.

rather than directly. Medieval battle was essentially a muscular business and muscular stamina set a limit on the amount of killing a medieval army could do. The archers, whose bows added a mechanical increment to their strength, had probably been responsible for a fair number of deaths at the beginning of the battle, though only during the short period when the French were at very close range; the cloth yard arrow could penetrate plate armor, if at all, only at a very small distance. The English men-at-arms, wielding swords and lances, and the archers, once they had abandoned their bows for axes and clubs, must therefore have been responsible for most of the French casualties. Given their small number, however, they cannot have sustained the fight for very long before muscular exhaustion began to set in, certainly not long enough to have inflicted fatal wounds on five or six thousand Frenchmen wearing plate armor, which offered few chinks to a lethal thrust and deflected ordinary blows.

It seems likely, therefore, that many of the Frenchmen were not killed outright but died either from "accidental" injuries or from unattended wounds. Serious accidents must have been plentiful on the battlefield, particularly falls from the saddle, which, under the weight of armor, easily resulted in fractures of the limbs or spine. More common must have been suffocation under crowd pressure: the Duke of York, one of the few English casualties of note, was found under a pile of bodies, dead either of a heart attack or suffocation, and the English archers are described by the chroniclers pulling down the "walls of dead," once the fighting had stopped, to look for still breathing Frenchmen of ransomable value. But unattended wounds, as on so many battlefields, were probably the principal killer. Loss of blood, leading to irreversible shock, and exposure overnight to autumn temperatures, must have ended the lives of many men whom early, even if the most simple, care might otherwise have saved.

Delivery from final disaster

The English, who had suffered only a few hundred casualties themselves, had been granted an extraordinary delivery from disaster or ignominious—and financially ruinous—surrender, and were understandably elated by the outcome. But what had sustained them during the preceding hours of uncertainty, risk and horror? They were not of course peace-loving men, as so many of today's conscripts are, so that it is unrealistic to ascribe to them humane or peace-loving attitudes. Violence was a commonplace of medieval life, many of the archers had enlisted as an escape from criminal charges at home, while the men-at-arms had been reared to think of combat—with their social

In the movie *Henry V*, the king led the charge. In fact, it was the French who charged, and met disaster.

equals—as a natural and laudable activity. But Agincourt had confronted them with a degree of risk well outside the acceptable limits. What had helped them outface it?

We should not discount the power of religion. The archers, before taking their places in the line of battle, had gone down on their knees, taken earth into their mouths and made the sign of the cross as a sign of the death they were thereby accepting. All had heard Mass the night before; Henry had heard Mass three times. His presence, too, must be counted as a powerful inspiration to the men, many of whom would have been able to see him in the thick of the fighting and hear his cries of encouragement. But two factors perhaps more powerful than spiritual faith and human loyalty were also at work: avarice and compulsion. No medieval battle can be understood at all unless allowance is made for the individual soldier's hope of winning—or avoiding—ransom. Men-at-arms sought out opponents of equal standing partly, of course, because they hoped to win fame, and hear it broadcast, but partly because to capture such an opponent was to win riches. Even more so would that have been the hope of the common soldier, who had no other prospect, in a moneyless economy, of making a fortune. The atmosphere of a medieval battlefield was akin in some sense, therefore, to that of a goldfield during a big strike.

More impersonal, but more powerful and insistent, was the simple lack of choice with which all the English soldiers had been faced. They could not retreat. If they were not to starve on the battlefield or enter into a ransom bargain with some Frenchman, they had therefore to fight and either win or die. Compulsion had operated even more harshly on the French. Though they had entered willingly into the fight, in response to the English archers' provocation, many of them had been literally shoved into contact with the English and been obliged to fight for their lives without hope of retreat or deliverance. Indeed, it was the efforts of those behind to support them which had sealed their fate.

Compulsion, and sometimes direct coercion, seem a universal ingredient of battle. If a study of Agincourt reveals no more than that many men went unwillingly to their deaths there, what would be the point of examining human behavior on that battlefield in any

Bibliotheque Nationale, Paris

detail? Perhaps more has been revealed than that: that human motives do play their part, Honor not least among them. Exactly what those motives are, however, will vary from age to age and place to place. Honor, as the medieval man-at-arms understood it, took a quite different form from that in the heart of the modern conscript infantryman, conscious of his anonymity in the olive-drab crowd and animated chiefly by loyalty to a tiny circle of buddies. To him, equally, the medieval soldier's dream of finding riches through fighting would seem ludicrous, the modern battlefield being barren of wealth and a safe return home being his principal aspiration. Yet unless we can glimpse what it is that animates soldiers at the point of maximum danger, we cannot understand the nature of the armies which fight battles—the central act of warfare—or judge the usefulness of battle to societies that wage war.

Unsophisticated in technique, this illumination from *Les Vigiles de Charles VII*, 1484—a contemporary newsphoto, so to speak—gets in some of the gore and detail. Note the bound prisoners at right.

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Seville
BY CADILLAC

Angel Cage gives humans a bird's-eye view of bars and, well, some other birdcages.

Architect Arata Isozaki likes multilayered, complex effects, used mirrors to obtain them.

By Peter Blake

Fun and dazzle rivaling Dadaism of the Twenties

Tour of exhibition opening Smithsonian's Cooper-Hewitt Museum beguiles and startles, what with birdcages, kites, flags and bread

At long last the "new" Cooper-Hewitt Museum of Design in New York is open to the general public. It opened with quite a bang—an exhibition the like of which has not been seen since the Dadaists romped in the 1920s.

The exhibition is entitled *Man Transforms* and subtitled *Aspects of Design*—titles that may (a) successfully obfuscate what, in fact, *does* go on in the Cooper-Hewitt's galleries; and (b) predictably raise feminist hackles. As a matter of fact the original or "working" title of the show was, for a long time, *Metaphors and Metamorphoses,* which was even more confusing than *Man Transforms,* but had the distinct advantage of not sounding sexist. Unfortunately, it was not readily translatable into English—not surprisingly so, since the chief designer of the Cooper-Hewitt exhibition is the brilliant Austrian architect Hans Hollein; and his coworkers on upper Fifth Avenue, in Manhattan, are Japanese, German, Italian, Iranian and Scottish, as well as American in the form of Buckminster Fuller—all of whom are charmingly unintelligible in, roughly, 73 languages.

We shall return to *Man Transforms* in a moment. But, first, a word about the Cooper-Hewitt itself.

"The Cooper-Hewitt collections of decorative arts and design were started by Sarah, Eleanor and Amy Hewitt, granddaughters of Peter Cooper," a museum leaflet tells us. Their collections were the foundations of the Cooper Union Museum, opened in 1897. During the next decades, the Hewitts devoted much of their

Photographs by Yale Joel and Cooper-Hewitt Museum

The very grand staircase of the Carnegie mansion is a lordly backdrop for part of a flag exhibit.

time, talents and money to expanding the collections.

In the 1960s, Cooper Union decided to do away with the collection, and a committee was formed to save it. It did. Four years ago, the Carnegie Corporation deeded the Andrew Carnegie Mansion (and its beautiful garden) to the Smithsonian, which had acquired the collection in 1967. The mansion, a 1901 neo-Georgian pile of brick and stone, designed by the architects Babb, Cook & Willard, and until recently the home of the Columbia University School of Social Work, stands on Fifth Avenue, between 90th and 91st Streets, not far from the Guggenheim, the Metropolitan, the Jewish and the Frick museums.

The new museum ranks with London's Victoria and Albert and Paris' Musée des Arts Décoratifs as one of the world's most encompassing and detailed design resources. There are hundreds of thousands of objects spanning 3,000 years of civilizations. They include drawings, prints, wallpaper, textiles, ceramics, glass, furniture, metalwork, jewelry, architecture, fashion, interior and industrial design—and an extraordinary collection of birdcages and other offbeat items.

There is a major library, specialized archives on pattern, color, symbols, and a picture collection of more than one-and-a-half-million items. Beyond that, the museum has the largest collection of drawings in America, and a fine collection of 19th-century American paintings, including many outstanding works by Winslow Homer and Frederic Church.

An inspired and risky beginning

We are—about seven years ago—outside this mansion, some 70 years after Andrew Carnegie built the pile, and a tiny determined woman called Lisa Taylor has just been named director of the Cooper-Hewitt Museum. Her first problem is to give the old thrift shop a new "image"—to turn it into a new national museum of design. You can do this in one of several ways: you can get surefire pros like Charles Eames or Ivan Chermayeff to perform their predictably polished acts; you can get Bob Venturi, the Philadelphia pop-architect, to produce the kind of American signs and symbols show that he recently mounted so brilliantly at the Renwick Gallery—neon, billboards, White Tower diners, that sort of thing; or you can take a terrible chance, and invite a latter-day Dadaist, an inspired magician, and pray. Lisa Taylor took this chance. And this exhibition is in great part the product of her gamble.

In short, what we have here, at the Cooper-Hewitt, is the most amazing tour de force since all those sailboats arrived from across the Atlantic. Your typical, modern exhibit can be, let's face it, a crashing bore: the designer takes you, sequentially, from Point A to

Man-made stars (except for starfish) against a blue dome show how variously a shape can be interpreted.

Point B, thence to Point C, whence you progress, inexorably (but not very suprisingly), to Point D—until, after what seems like a lifetime, you have arrived at some kind of QED—some place in the outermost reaches of consciousness—and you stagger off, your mind improved, your consciousness raised, your insomnia cured.

But Hollein starts out with something that makes a sort of sense—the four ancient "elements": air, water, fire and earth; and the five "senses": smell, touch, taste, hearing and sight—and then he takes off like Chinese firecrackers . . . first one way, then, crack! off at a 30-degree angle, then up, then down, then off again at still another tangent . . . caroming off some daffy configuration in the lowest depths of our subconscious and then. . . . Eureka! An ultimate coruscation and stars (literally) light up the firmament, and you just stand there, in awe, and decide that this character, Hans Hollein, has got to be the craziest galoot to come out of Vienna since Anton Mesmer—and a brilliant one at that. Certainly the most entertaining.

Let me try, just tentatively, to explain how Hollein's exhibition works, sequentially—if "work" is the precise word I am groping for. Here we go. Subject: Air. TAKE ONE. Hollein starts tamely enough. Air equals breeze. How do you "exhibit" breeze? Answer: lots and lots of beautiful flags, and a powerful fan—obviously! So far, so good. You get the message, and you are still on firm ground. But it's time to fasten your seatbelts, friends, because you are about to slam into a white, arabescato marble flag. *Marble flag?* You've got it. Futurism, Boccioni, Victory of Samothrace, wings of marble . . . next, 30 degrees off the right, wings of cloth, kites, planes, sails, windmills . . . then: Socrates! (Stop asking silly questions.) Socrates, shrouded in cloth; and a dragon robe; and an amphitheater of saris. (Hold it! an amphitheater of *what*?—Please don't interrupt. . . .) And more cloth—cloth as a "tool" (tents, kerchiefs, close-fitting cloth versus loose-fitting cloth). And then, bandannas.

We are now cruising at an altitude of approximately 40,000 feet, I think, and running out of, well, air. No, not at all, says Hollein; we haven't even started to breathe: the big thing about saris, tents, and so on, let's face it, is the seamless surface. As you get more and more sophisticated, it appears, you get more and more seamless! What's the most seamless thing of all? Right: bowls! BOWLS? But, then, weren't we saying something about cloth just a minute ago? OK, back to cloth, if you insist: specifically, scarecrows.

A flight from scarecrows to birdcages

Which, with absolutely inexorable Hollein logic, leads us, quite obviously, to the birdcage room designed by the Japanese architect Arata Isozaki. You walk into this room, having just encountered a scarecrow—and, zounds, *you* are the bird! You are inside this huge birdcage (actually an "angel cage," pp. 72-73), looking out at the world (a world, needless to say, made up of a number of birdcages, large and small), and what you see is what the bird sees: bars. Terrific!

I am not about to try to explain or to explore the sort of chemistry that bubbles up between an inscrutable Austrian and an equally inscrutable Japanese. There is, one gathers, no word for "no" in Japanese, except that there is and it frequently means "yes." That is all that anybody ever needs to know about Japan—after which you can relax and enjoy all of it. And it roughly applies to Vienna—there *is* a word for "no" there, but it has never meant very much.

OK. I will not try to speculate on how you and I get into that birdcage. Nor will I try to speculate on how and why you and I will next be—HOLD ON!—in an antigravity room, in which liquids—possibly mercury, possibly not—level one way, while we level another. And in which the Leaning Tower of Pisa leans every which way. I think it may have something to do with the fact that we have recently been slightly unhinged, right? And so, gravity, which is somehow related to "air" (the apple? Newton? Archimedes? perhaps even

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From the huge Cooper-Hewitt permanent collection, one of the world's most notable, are, from the left:

Meissen figurine in porcelain made in 1760, one of a series representing the continents; appliquéd

Socrates?). Well, Isozaki and Hollein clearly understand what is going on here, and so do the birds.

There are a number of other interesting things that happen at the Cooper-Hewitt exhibition. None of them rise to quite the level of zany free association that Hollein and Isozaki (with an occasional assist from S. Freud) have been able to attain in their elaboration on the theme "air." None of them quite rise to the level of perfection in detail—for Hollein's work, as an architect, is probably unparalleled in polish and in spectacular finesse since Mies van der Rohe built his German Pavilion at the Barcelona International Exposition in 1929 out of, roughly, platinum.

It is difficult to convey the precise degree of Hollein's inspired madness. Not long ago, he completed a jewelry store in Vienna, and the storefront was entered through what appeared to be a savage cleft administered by some omnipotent god to a block of polished, reddish-brown Baltic granite—the ragged edges of the cleft being lined with layers of glistening brass. Now, why anybody in his or her right mind would want to enter a store to buy an earring by smashing its granite front is something for Sigmund to explain . . . but there is no other designer in the world today who would have throught up so bizarre a way of entering a building. And there is no other designer in the world today who could have done it so beautifully.

We have been spending all of our time, so far, on the top floor of the exhibition. If one were describing a regular, Museum-of-Modern-Art type of exhibition, one would come in at the entrance, and leave at the exit. Because everything here is just a trifle unusual, we came in more or less in the middle, through a window. (Air? Birds? Wings? Breezes? Kites? Flags? Fifth Avenue parades?)

Anyway, we are now going to try and get into this building, into this exhibit, the way normal people will do, from 91st Street, between Fifth and Madison. Everything seems to be OK at first, more or less, as we walk up the granite steps. The doorman (whose name *is* Sigmund) looks friendly, and the great entrance hall of the old Carnegie Mansion is about as gloomy as you'd expect it to be.

But then there is this huge fireplace. Inside this fireplace there sits a color-TV set, and the program is FIRE! A nice homey fire that turns into Buddhist monks, self-immolated; then back to the homestead.

Is the Cooper-Hewitt burning? Why not? At the far

and embroidered cardinal's missal, Italian, early 18th century; a desk of oriental woods inlaid

with mother-of-pearl and brass, from Milan, 1905; and an idyllic sweep of French wallpaper, 1925.

end of this floor, there is a roaring fire, and this suggests, in obvious free association: baking (hence something like 239 different kinds of bread—pp. 78-89); anvils (hence about 150 hammers); and light (hence stars, p. 75, and a fake planetarium). There is also, on this floor, some free associating with water . . . which brings up ice, Eskimos, igloos and oases. Obviously.

Here we are, then, looking for "meaning," looking for a "message." Man Transforms—how, what, and into what?

The answer, of course, is that virtually all designers are illiterate. That is, *verbally* illiterate. Yet they insist on *talking*. Their language, as Gyorgy Kepes pointed out years ago, is the "language of vision"—and that might have been a good title for this exhibit. What makes Hollein such a superb designer is that he doesn't try to talk—actually, he does, but since he may make no sense, he could be silent—what makes him such a superb designer is that he speaks the language of vision, including the poetry of vision, the prose of vision, the comedy of vision and the tragedy of vision.

Just how verbally illiterate designers are is beautifully demonstrated in the April 1976 issue of a Japaness magazine called *A & U* (Architecture and Urbanism). It contains a conversation between the American architect, Richard Meier (who has a metal-plated 3-D Scrabble game at the Cooper-Hewitt), and Arata Isozaki, the birdcage man. Sample dialogue:

ISOZAKI: Yah, that means, you like not a simple transformation or simple way to learn or simple way of expression. You like the multilayer for the multitude of many-layered expressions. In every way. And also not only for physical but for sometimes literal or sometimes conceptual or sometimes artistic and sometimes . . . scientific. You like to combine or you like to collage or you like to integrate such a different way. . . .

MEIER: What interests me and I can't figure it out yet is what is the meaning of the Marilyn Monroe profile that reappears in all of the [Isozaki] buildings from the Bank at Fukuoka to the Fine Arts Museum in Takasaki. . . .

ISOZAKI: Just only consistency. [Laughing]. It is very hard to explain why. Before, more than 10 years ago, I took her shape and I made a rule, a curve rule. That is the only reason I am using her curve in my building. . . .

MEIER: But what is this preoccupation you have with this profile?

ISOZAKI: That's because I pin-upped her famous picture beside my bed. That's the only reason.

Of course, Isozaki, like Hollein, speaks the language of vision. Meier speaks the language of words—hence his Scrabble set. It is a very beautiful Scrabble set, by the way, and it is supposed to say something about constraining grids, and freedom within them. . . .

In other words, CHOICE! We are now down in the basement, with Ettore Sottsass jr., the absolutely inspired Milanese designer for Olivetti and others (on whose rubbery chair I am sitting while writing this); and Sottsass' exhibit has to do with choice (I think).

In an Emilio Ambasz exhibit at the Modern, Sottsass was quoted as saying, about some modular furniture that he had designed for the show, that "the pieces of furniture move like beasts of the sea, they diminish or increase, they go to right or left, up or down, they coalesce into colonies, dissolve into dust, solidify into rocks, or soften to plankton. . . ." So they do. Precisely.

And while we are in the basement, let us drop in on Oswald Mathias Ungers, the German architect who is based in Cologne, Berlin, Los Angeles and Ithaca, New York. Ungers is the one designer in this show most clearly concerned with metaphors and images: his exhibit is perhaps closest and clearest in spirit to what Kepes meant when he talked about a language of *vision*. "Objects become meaningful through vision," Ungers says, "and . . . not, as Max Planck believed, because [they are] measurable." Ungers' exhibit is really the one most deeply involved with analogies and their transformation into designs: living cells that are transformed into city plans; human plumbing that translates into the infrastructure of a city. Very heavy stuff.

There is, of course, much, much more. There are two-minute movies by some mad Scottish genius named Murray Grigor that show how a man transforms himself, via a police identity kit, and a woman transforms herself from (unbelievably) Marilyn Monroe into Andy Warhol. There is a plastic *Sacred Space* by the U.S.-educated Iranian architect Nader Ardalan, and his associate, the German sculptor Karl Schlamminger; and their exhibit deals with symbolic forms traditional in Sufism. At least, that is what I *think* their exhibit is all about.

We are back on the main floor, having just staggered through a dozen or more Hollein doors that open or don't open but, anyway, don't seem to open the way normal doors are supposed to open. One is a "choice door," one a "camouflage door," a third is a rubber door. Hollein once did an exhibition, in Milan, in which there was a door with 42 door handles, only one of which actually worked. The door was named "Frustration Door," which tells you something about Hollein, about frustration, about doors, and about why we are now making a beeline for the nearest exit. But not before going through Peter Bode's own frustrating door knob-and-handle room where only a few of the 100 handles actually work. Who said getting out was easier than getting in?

Enough is enough, and this incredible exhibition is enough in spades. Bye-bye, Anton Mesmer.

You might be interested to know that the "Guide to New York City," published a few years ago by the American Institute of Architects, described the former Andrew Carnegie mansion in one, mysterious sentence: "When Carnegie built this chateau, squatters occupied the whole area." Well, Andrew Carnegie is gone; but some kind of squatters are still there, and I hope they live forever.

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Text by Shelley Mydans
Photographs by Carl Mydans

Balinese rituals appease demons of an unseen world

The beauty of the offering, the artistry of the moment, are important to the island's enduring ceremonial traditions

A *leyak* is a witch, a ghost, a weird nocturnal animal or malicious spirit. *Leyaks* are everywhere on Bali, waiting for the evening shadows to grow long and the night to close down on the darkened rice field, on the crossroads under the "fear tree," on the cemeteries and lonely temples of the dead.

"I can show you where the witch lived," our driver volunteered. "She's dead now, but my friend is living. She asked him for medicine, some food, *anything*, but he wouldn't. She's dead now."

"What happened?"

"My friend is a fisherman, and every night when he bicycled back from the sea with his catch he felt the bicycle grow lighter just when he passed this place. And when he got home the basket with his catch was gone. So he took a piece of *ujung* with him—that's the old rotted black bamboo the fishermen use sometimes to lure the fish. They use it to keep away the *leyaks*, too, when they're digging bait by the shore. He took it to protect him from the witch who was taking his fish from the basket.

"That night when he passed the house he felt the bicycle grow suddenly heavier. Because of the *ujung* the witch couldn't lift the basket, so she turned herself into a black monkey and climbed on the bike behind him. He kicked out backwards with his foot and hit something solid. Then the bike grew lighter again and he went on home.

"Next day the old lady who lived in that house was sick. She came to him and asked for some medicine, any kind of medicine, or even food. That's the only cure for a witch who has been hurt: the person who hurt her must give her medicine. But my friend would not. He wouldn't give her anything at all.

"She grew very ill and was taken to the hospital and after three months she died."

In this case the fisherman was brave and the *leyak* not so very frightening: only an old woman who stole his fish and turned herself into a monkey. Other Balinese have been terrorized by baldheaded, giant *leyaks* running after them at night, by vampire *leyaks* leaning to suck their blood, by demonic spirits who cause the earth to tremble.

Nature has painted Bali in pastels. Balinese rice fields are the purest green of all the world's vegetation, the surrounding sea is clear, the skies a gentle blue. Palm fronds wave, and pale clouds obscure and soften the sharp outlines of the volcanic mountains. But like the volcanoes, history has erupted into violence in Bali many times, and much of Balinese religious practice is devoted to diverting that violence and placating the evil spirits that foster it.

To keep them from entering their temple grounds, the Balinese carve monsters with open mouths and outstretched hands over the outer gates and set fierce guardian gods beside them. At the entrance to every household compound there is a little screening wall, because it is well known that evil spirits cannot turn corners in the dark. (Sometimes, like the practical-minded Chinese, they may hang bits of mirror on these screening walls so that an approaching demon, catching sight of himself, will frighten himself away.)

Masks scare evil spirits

Foreigners cannot see *leyaks*, but our driver had concluded that we had an interest in witches because we had visited the mask-carver Ida Bagus Gulodog in his home in the village of Mas, and he, being old and close to the gods and full of humor, had put on a mask that he had carved of the witch-queen Rangda with her curved white fangs, her yard-long lolling tongue and goat-hair wig. He had put on the mask as though in fun—and suddenly he *was* Rangda, glaring at us with her arms out and her hands extended as though to threaten us with her ten-inch fingernails.

All masks on Bali have a special significance. But those of Rangda and of the *Barongs*, her opposites and opponents, are considered magically potent. (The *Barongs* are mythical animals friendly to mankind,

Balinese girls bring food and flowers to Mengwi temple to be blessed and offered to the gods.

In a *Barong* dance the witch-queen Rangda enters on the shoulders of her demon attendants.

though they were created out of the same supernatural substance as Rangda and her followers.) Some of the very old and extremely magically potent masks are kept covered in their special temple pavilions lest the vibrations affect those around them, and whenever they are taken from their resting places they are followed by processions of men and boys.

It is said that in 1966, when President Suharto was trying to loosen the almost mystical hold that the former "Lifelong President" Sukarno had on the Indonesian people, his spiritual advisers told him that Sukarno's superhuman power came from nine sacred *kris*, long serpentine daggers, that he had in his possession. The only way to overcome the power of these *kris*, they said, was through the superior power of an ancient mask that was kept in a temple on Bali. Suharto sent his aides to persuade the Balinese priests to lend him the mask for a thousand days, and when at last they agreed and the mask was brought to Jakarta, the president paid homage to it every day—so the story goes—while his self-assurance grew to the point where he could break the hold Sukarno had on his followers.

Although the masks that Ida Bagus Gulodog makes are of the highest quality, they don't yet have the magic power of those his father's and his grandfather's generations carved. Those men, like Gulodog himself, were of the Brahman priestly caste (Ida Bagus is a caste title), whose sensitivities have been refined to deal with the spirit world. Now, at 65, he is wise enough to paint the Hindu *saka* calendar with the individual gods who are in charge of each of the 12 months. This cannot be done unless the artist is able to paint in a meditative frame of mind in order to keep the world calm. And he must know the proper gods in order, for should he err, there may be earthquakes in that month.

The *saka* calendar is most important for its calculation of the phases of the moon and of the Balinese new year, which falls on the spring equinox at the end of the rainy season. Then the evil spirits must be fed; offerings of wine and flesh are piled at every crossroad; and the priests stand on high platforms reciting spells to purify the land. In the night the people rush into the streets sounding gongs and cymbals and brandishing torches to drive away all ghosts and witches.

The writer-photographer team of Shelley and Carl Mydans have reported on the Burmese National Theater and Singapore's Chinatown for SMITHSONIAN.

In the same performance, the *Barong* liberates his bewitched followers, the *kris* dancers.

Enchanted Prince Sadewa, bound to a tree in the cemetery, awaits Rangda, goddess of death.

There is another Balinese calendar, the *wuku*, which marks the Balinese year of 210 days, dividing it into a complex system of one-day to ten-day weeks, of which the seven-day is the most important. By this calendar there are 30 seven-day weeks to a year. And it is this time system that prescribes the timing of the festivals in the more than 10,000 temples on the island.

Every village on Bali has at least three temples: the village temple for official ceremonies, the temple of origins which honors the village founders, and the temple of the dead dedicated to the deities of death and cremation. Besides these, there are the clan temples, the little temples of each village ward, and the temples of the farmers' guilds set in the jade-green fields. In the depths of the steep valleys or set in dark forest groves are moss-grown shrines protecting sacred springs or monkeys honored by mythology. There are hill temples and market temples and cave temples. And in every little packed-earth compound along the narrow roads rise the multitiered, thatched roofs of a family shrine, dedicated to their ancestors.

A Balinese temple is open to the sky. The walls of its courts have been laid out by a master sculptor who has learned his art from his father and his grandfather, and the measurements are in multiplications of his outstretched arms, his pace, his foot. The narrow gateway with its high stone steps and guardian gods faces the direction of the sea, that fearful element. The elevated pedestals with their conical roofs, or *meru,* are the "sitting places" for the gods when they come visiting and are on the side of the compound nearest the sacred mountains.

Every village, clan and family has its special days when the gods or ancestors are invited to descend to Earth and take their places on the *meru* seats. They are greeted with offerings of fruit and flowers and brightly colored rice—but the ceremony to placate and drive away the evil spirits must always precede this invitation, lest the gods be dishonored by impurity.

The most important festival celebrated by the entire island is the ten-day annual homecoming of all the gods on Hari Raya Galungan. The festival commemorates the victory of the people over a legendary king who forbade them to worship their ancestral deities. The religion was then, as it is today, Agama Hinduism which was showing some influence in Bali as early as the fourth century A.D. (It came to Indonesia through Indian traders some 2,000 years ago.) It is the peaceful

Statues of demons guard temple gates to frighten away evil spirits. Often during the festival days they are adorned with hibiscus blossoms, as above, or draped in black-and-white checked sarongs.

Continued on page 88

How to own great art if you're not the Queen of England

Unless you're royalty (or at the least, a multi-millionaire), you probably won't ever own an oil painting by one of the great modern masters — because such paintings sell for hundreds of thousands of dollars.

But you *could* afford an original print by Dali, Calder, Miro, Chagall, etc.—a signed-in-pencil, numbered, limited-edition work of art that you and your family will cherish forever.

We're not talking about reproductions. (If you are interested in reproductions, there are many museum shops and poster stores that will sell you photomechanical reproductions of famous works of art for a few dollars. Personally, we think they're all right for a dormitory wall, but inappropriate in an otherwise gracious home or office setting.)

Bernard Gantner's original lithograph, "Edge of the Wood", signed limited edition of 150.

Rather, we're talking about hand-made etchings, engravings, lithographs, woodcuts and silk-screen prints. These are created on the plate directly by the artist and are printed by him (or by a master printer working under his supervision) in small, strictly limited editions.

For some multi-colored prints it may take as much as two hours to "pull" *a single impression.* When an edition is complete, the artist signs and numbers the prints. Then the plate is defaced or destroyed, so only a small number of people (sometimes 50 or 75, seldom more than 300) will ever own that work of art.

Which is why original prints by recognized artists tend to grow in value over the years — especially if the artists are chosen with their investment potential in mind. For example, over the past decade, works by the artists we have offered have appreciated at an average rate of more than 30% *each year.* (Some cases are more dramatic. Newly discovered artists have seen their work grow in value by several hundred percent a year. This is one reason why the Original Print Collectors Group pays so much attention to young, up-and-coming artists.)

Who's the OPCG?

The Original Print Collectors Group is *not* a spin-off of a million-member book or record club. Rather, we are a relatively small organization of art lovers who have banded together (a) to keep abreast of the latest news, trends, and developments in the world of original graphics, and (b) to contract, whenever possible, for the entire edition of a print, bypassing several layers of middlemen and thereby allowing our members to acquire the print at a substantial saving, compared to gallery prices. We also certify the originality of the prints we sell and we protect our members with a money-back guarantee.

Peter Hurd's original lithograph, "Night Visitor", signed limited edition of 260.

Salvador Dali's original lithograph, "The Promise", signed limited edition of 100.

If you are interested in owning signed, limited-edition original prints, and if you would like to learn more about membership in the Original Print Collectors Group,we invite your inquiry. We will be happy to send you a complete description of how our Group operates, a color brochure depicting the prints we are currently offering our members, and a sample issue of the 12-page newsletter our members receive bi-monthly.

Johnny Friedlaender's original etching, "Petit Soleil", signed limited edition of 200.

NOTE: If, after receiving our literature, you decide to become a new member, you will be rewarded with a handsome American Heritage art book, *The History of Prints and Printmaking from Dürer to Picasso,* a $22.50 retail value. But our supply is limited. So mail the coupon today. There's no obligation.

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The carved wood witch's head was made to be admired and offered to the gods.

Snaggletoothed witch (identified by the dangling tongue) decorates an artist's garden.

worship of one omnipotent being, source of all creation, in whom all deities (including the later incorporated gods of Bali's native animism) achieve a higher unity. There are no temples, altars or shrines dedicated to this Supreme Being. He is approached, in effect, through his many manifestations.

Priests of the Brahman caste on Bali study the complicated theology of Agama Hinduism and guide the people through the many ceremonies that honor the many deities and placate the evil spirits. For on Bali everything is divided and apportioned between good and evil, day and night, high and low, the peak of Gunung Agung, the island's highest mountain, and the depths of the dangerous sea. High on the mountains and in the sky dwell the divinities that bring good fortune; deep in the darkness of the sea or under the covering of night lurk the monsters that threaten men. All must be taken into account and given their due offerings in order to maintain a harmony of life.

A ten-day welcome for the gods

In that mythological war of the people against their godless king, the people won and ever since then the Balinese have celebrated the national festival of Galungan. For ten days along every road, in front of every house, tall and gracefully decorated bamboo poles called *pendjor* are raised to welcome the gods. They make a feathery canopy, their soaring line echoing the slope of the sacred Gunung Agung. Each pole is embellished with a filigree of sprays and curlicues made of the fresh young fronds of the coconut palm, and each is weighted by a palm-frond tassel or lantern or perhaps a little cage of flowers.

The *pendjor* poles are made by men. Women weave long plaques of dark green banana leaves and golden palm fronds, called *lemak*, and hang them from the bases of the *pendjor* or from small woven bamboo shrines. All are examples of the Balinese creative spirit nurtured by their dedication to an unseen world.

Not only on festival days but every morning of the year it is the first duty of the Balinese housewife to put out the little woven palm-frond baskets with their morsel of rice and scattering of flower petals—not only for the gods but for the evil spirits as well. Every little girl on Bali knows how to make these offerings, but it is possible to buy them ready-made in the market or the little wayside stalls where they are displayed alongside bars of soap, packets of clove-scented cigarettes, mosquito coils and glass jars of cheap candy.

Offerings for the deities are placed on the pedestals of shrines or household gates; those for the evil spirits put on the ground. But just as these latter are soon shriveled, scattered, nosed by dogs, so are the elaborate *pendjor* banners and woven *lemak* soon dried

Continued on page 90

The handcrafted watch.

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and faded, curling upon themselves. No matter. It is the beauty of the offering that counts, the artistry of the moment, the anonymous prayer in the work of skillful hands.

With the recent "discovery" of Bali as an important tourist center, local observers say they are afraid that the purity of Balinese traditions and artistry will be corrupted and their special ephemeral world will disappear. In fact, nearly 40 years ago the Mexican artist Miguel Covarrubias wrote that Bali would soon be spoiled. And it is true that today the artisans of Bali are turning out "primitive" canvases by the yard and smoothed-down satinwood statuettes by the monotonous shelfful to please the two-day stopover tourist and export market. But after all, as one Balinese aristocrat and patron of the arts remarked, they're better than plastic. And they do have their function in bringing foreign exchange to an island with an increasing population—and therefore poverty—as well as rising expectations for such things as public education and improved transportation.

Undoubtedly it is distressing to an upper-class Balinese or longtime foreign resident to see the children swarming to meet the tour buses, holding up anything from a polished shell to a gaudy postcard to an imitative bit of carving crying "One dollah! One dollah!" But tourists can serve a purpose. Once we came upon the preparations for a *Barong* dance at a little village temple along the road to Ubud. We heard the sounds of the *gamelan* coming from the outer courtyard and looked in. An old man was placing a multicolored flower offering on the swept ground and the temple priest was flicking purifying water from a glass jar. Beyond them, through the high gateway to the inner court, we could see dancers putting on their heavy makeup and bright costumes crusted with gold brocade. Two farm boys in the red-and-white striped leggings of *Barong* dancers were getting ready to put on the lionlike shaggy costume with its grinning mask.

"What festival is this?" we asked. It seemed unusual that there should be a *Barong* in the middle of the day. "Is it your *odalan* today?" *Odalan* is the birthday celebration that each village temple holds once every 210 days of the Balinese year.

The priest seemed puzzled. "Not *odalan* today."

"Special day of the Galungan holiday?" We smiled, but still got puzzled looks.

"Why?" we insisted. "What is the *reason*?"

"Oh," he said, nodding. "Reason. Yes, the reason. Bali Beach Hotel."

Formerly it was enough to do these things to please the gods. Nowadays, with the concept of money introduced into their culture, they have learned what sells.

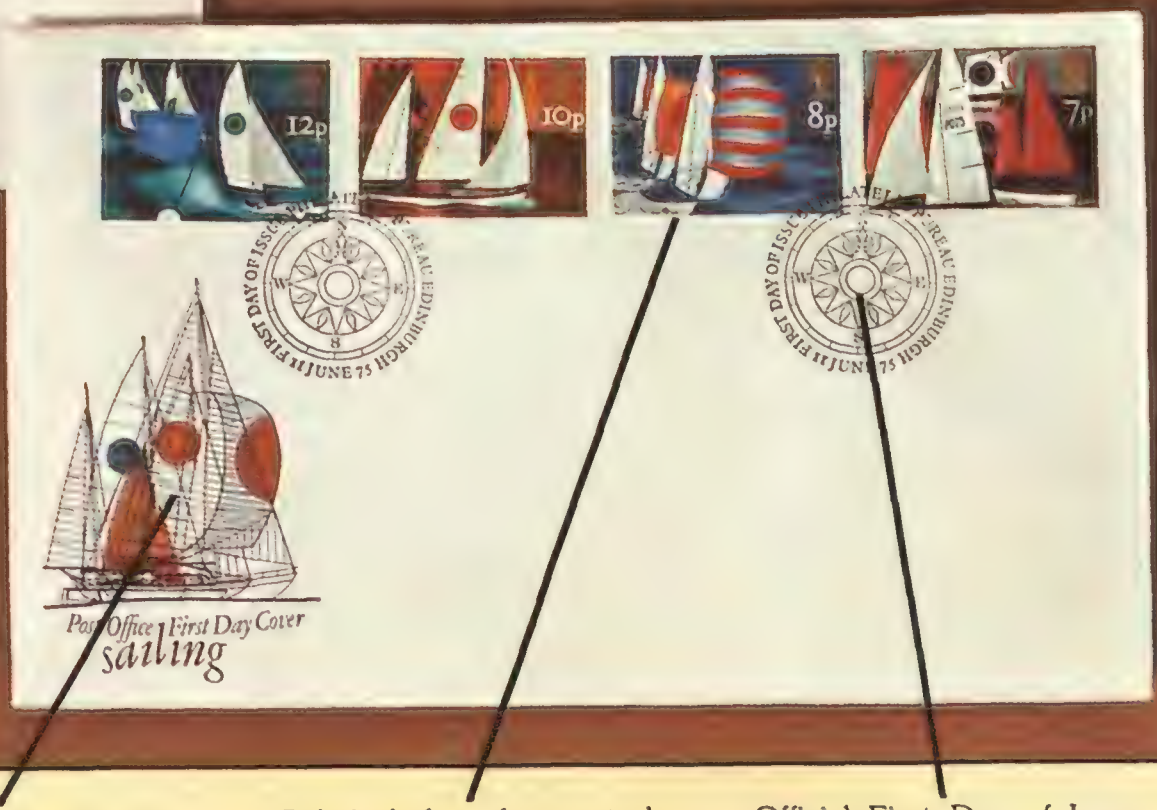
That does not mean that the gods are any less real or the spirit world has grown dim. It is still true that after sundown, when the ducks have been herded home and the long shadows have turned black on the rice fields, the *leyaks* are on the prowl as always, breathing sickness, threatening calamity, foretelling death. The embodiment of fear.

Weather has eroded moss-covered stone guardians at the temple of Sangeh in the monkey forest.

A procession of young women moves along a dusty path from the village toward a sacred spring.

Shown approximately two-thirds size.
Actual size: 7½" x 4½."

A First Day Cover of the Month in September, 1975, this issue devoted to Liechtenstein's architectural heritage demonstrates true excellence.



Members were fortunate in obtaining this British sailing series. For complete sets were sold out entirely on the First Day of Issue. It was a selection for June, 1975.

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An old tradition.

The tradition of collecting International First Day Covers is a rather old one, dating back to the late 1800's. Over the years, wealthy collectors, diplomatic officials, and members of royalty have built excellent collections.

They have prized them as the *most desirable* specimens of a Nation's stamps; for, unlike the entire printing of a new stamp, the First Day Covers are issued for *one* day only . . . and so certified by postal authorities of the issuing nation with the official "First Day of Issue" postmark.

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Selections of great merit.

Significantly, a number of First Day Covers selected by the Society have later become highly rated and eagerly sought after by collectors. An outstanding British Sailing issue of June, 1975, for instance, *(illustrated at left)*, took the philatelic world by storm and complete sets sold-out on the very First Day of Issue. Certainly, there can be *no* guarantee that any particular First Day Cover will increase in value or merit with the passage of time. But this example points to the quality of the Society's selections.

All Society selections are carefully chosen according to the same rigorous criteria. And chosen *before* their merits are widely discussed; when they can be obtained by Members of the Society at the original issue price.

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Strobe lights show how Burr, unaware of hair trigger, would bring his gun down and fire at Hamilton.

By Merrill Lindsay

Pistols shed light on famed duel

Was Aaron Burr really the bad guy, gunning down Alexander Hamilton in cold blood? Secret hair trigger may suggest the opposite

The sensational duel between Alexander Hamilton and Aaron Burr has taken its place among American legends, along with Washington chopping down the cherry tree. Hamilton, says the legend, brilliant former Secretary of the Treasury and driving force of the Federalist Party (who sought a strong central government), was ruthlessly gunned down by Burr, Vice President under Jefferson and later tried for treason because of his mad plan to set up a Mississippi Valley empire. Hamilton, mortally wounded in the shoot-out, gasped that he had never intended to fire. The truth is, the pistol in Hamilton's hand did indeed shoot harmlessly high, its ball striking a tree behind Burr, 12 feet up. Hamilton has always come across as the good guy, tragically slain. Burr has always worn the black hat.

Until recently, few have questioned this legend. And no one has looked at an important piece of surviving evidence—the pistols with which the duel was fought.

Let us explore a few facts. Burr came of illustrious parentage: his father was the second president of Princeton (then the College of New Jersey), his mother the daughter of Jonathan Edwards. In the Revolution, young Aaron was a gallant officer under General Bene-

After surreptitiously setting his trigger,
Hamilton may accidentally have fired too soon.

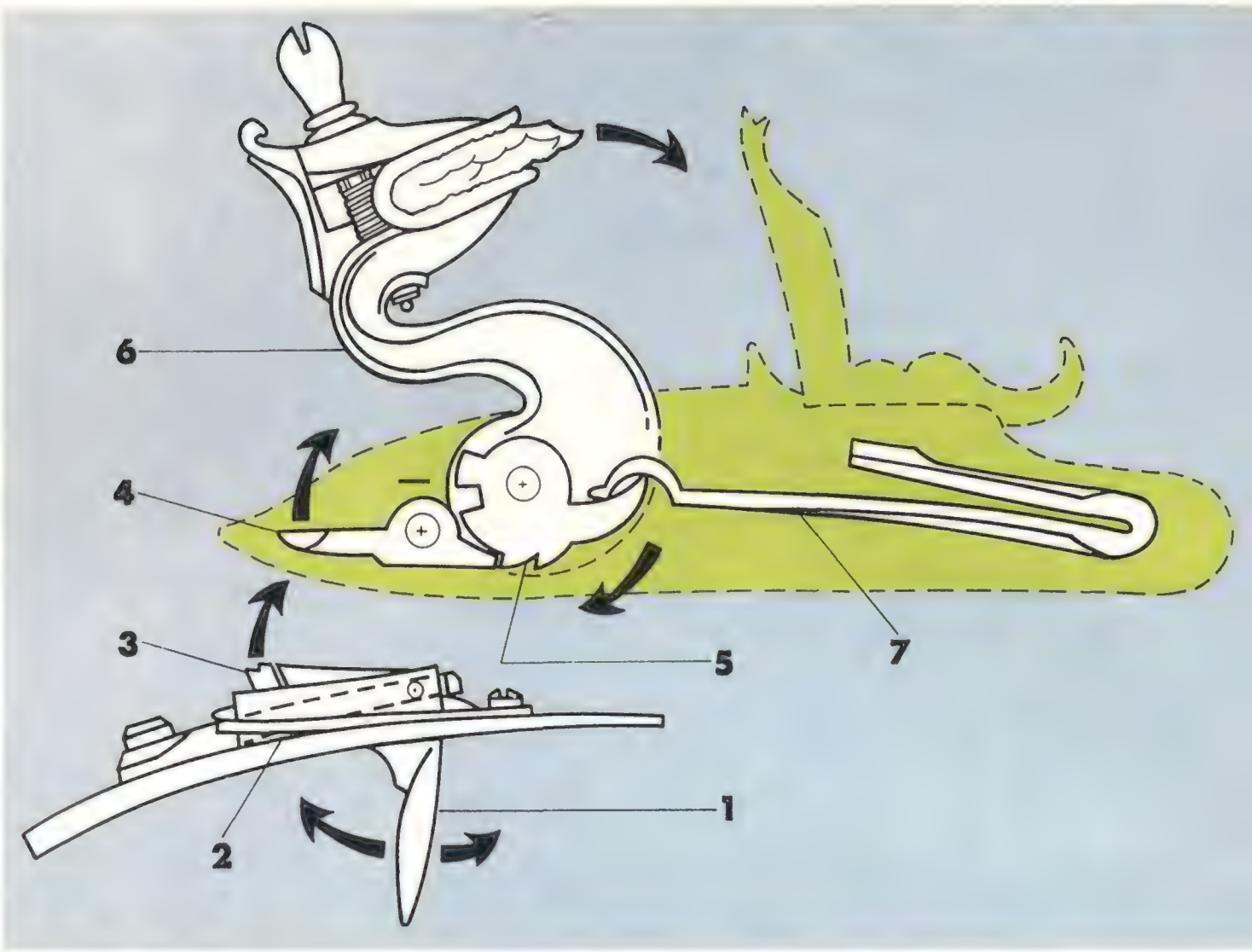
dict Arnold during the disastrous march on Quebec; later saved his brigade during the battle of Long Island; later still served creditably at Valley Forge and Monmouth. In politics he won the same number of votes as Jefferson for the Presidency, became Vice President upon decision by the House of Representatives. One edition of the *Encyclopaedia Britannica* notes, "His fair and judicial manner as president of the senate, recognized even by his bitterest enemies, helped to foster traditions in regard to that position. . . ." He was "generous to a fault, and was intensely devoted to his wife and daughter."

Hamilton, illegitimately born on one of the Leeward islands in the Caribbean, rose to prominence during the Revolution when he served as an artillery officer under Washington and also as aide-de-camp to the Commander in Chief. He married into the powerful Schuyler family and played a major role in forming a nation rather than a confederation of states.

Historians have pointed out that Hamilton, who hated Jefferson, hated Burr more and threw his lot against Burr and the Federalists in their preference for Burr's Presidency. Hamilton also contributed, along with his father-in-law, General Philip Schuyler, to Burr's defeat in his bid for the governorship of New York in 1804, the year of the fateful duel.

No one talks about the very real financial conflict between the two. Hamilton had played a major role in founding the Bank of New York and the Bank of the United States, which for a time enjoyed a virtual monopoly. Burr had an interest in the Manhattan Company, which had been set up to supply clean drinking water to the city of New York. Burr obtained a charter from New York State for the new water company. That company's charter included a clause giving it the right to engage in "moneyed transactions." So the Manhattan Company opened its first bank in competition with Hamilton in 1799, and on the day before its opening, Hamilton's brother-in-law, John B. Church, an experienced dueler who had killed his man in England, insulted Burr. The insult was deliberate, obviously planned and issued in front of Burr's friends. Burr, who could not have relished fighting

Arms expert Merrill Lindsay advised on Washington's sword collection, in SMITHSONIAN, *February 1975.*



Trigger (1) is set by pushing it forward. Then tiny pressure on it frees leaf spring (2), sending lever (3) up to strike sear (4). This disengages tumbler (5), and hammer (6) is driven by spring (7).

Church, felt required to challenge him. The duel was fought with Church's pistols. Burr had a button shot off his coat. Church was unharmed.

Five years later, in 1804, a letter in the Albany *Register,* signed by an upcountry clergyman, referred to Hamilton's "despicable opinion" of Burr. Burr demanded satisfaction. Hamilton chose to fight with Church's pistols.

The pistols that Hamilton provided had concealed hair triggers—what a modern target shooter would call a single-set trigger. Church had bought the pair in London. By using them, Hamilton could surreptitiously set his hair trigger without anyone's noticing. This would give Hamilton a theoretical advantage by allowing him to shoot very quickly with a tiny, half-pound squeeze on the trigger. Burr's gun had the same trick trigger, but Burr probably didn't know it. He would fire with the ordinary 10- or 12-pound pull.

Although Hamilton owned a fine pair of correct English dueling pistols, he elected to borrow the trick pair from Church.

With his pistol, the hair trigger set, Hamilton, I maintain, booby-trapped himself that morning of July 11, in Weehawken. Tensely, the two men faced each other. As Hamilton lowered the gun on its target, he was holding a little too tightly and accidentally fired before he had Burr in his sights. Burr squeezed hard and slow and put an aimed shot into Hamilton. The lead .54 caliber ball found Hamilton's liver and killed him within 36 hours.

I have booby-trapped myself many times shooting target guns with single- or double-set triggers, and my only excuse was the tension of a competitive match. Even though no one was pointing a loaded pistol at me, I squeezed too hard too soon and blew my hopes by throwing away a shot, high in the sky.

It is hard to know the intent of the dying Hamilton, who said that he had no intention of shooting Burr. He was either trying to make Burr out to be a cruel scoundrel which he succeeded in doing, or he was trying to divert attention from the pistols, realizing that they would do him no credit if the trick were found.

Actually, the Church pistols have several unusual characteristics which should have disqualified them for use in duels. They have not only concealed set triggers, but weighted bronze fore-ends, adjustable front and rear sights and a .54 caliber bore. While some of these features could be found on a cased pair of gentleman's pistols, none of them would appear on a proper set of dueling pistols.

The caliber for duelers had been established at .50—big enough to do plenty of damage. Proper dueling

X-ray photograph shows hidden mechanism set in a dueling pistol. Trigger is forward. Half-pound pull sends hammer bearing flint slamming down against upright frisson. Resulting sparks ignite the charge.

pistols do not have adjustable sights. Dueling with pistols usually required you to bring your arm down and pull the trigger when your index finger was pointed at your antagonist. You were not to take cold-blooded aim and drill your quarry through the left nipple.

How can we be sure that these pistols are indeed the ones with which Burr killed Hamilton? The bank Burr founded, which is now the Chase Manhattan, has done research in the archives and documents connected with this bit of history. A bank publication establishes that these pistols were used in three duels. The first, as noted, was between Church and Burr. The second was between Hamilton's son Philip and a J. G. Eckhardt—and Philip Hamilton was killed.

After the third and final duel, the pistols were returned to Colonel John B. Church by Hamilton's second, Nathaniel Pendleton. Colonel Church's great granddaughter, Mrs. Mary Helen Church Gilpin, has written about the subsequent history of the pistols:

"John B. Church purchased a large tract of land in Allegheny County in western New York and built the first stone house west of the Allegheny River, calling it Belvedere. In 1805 his son Philip, my grandfather, married the daughter of General Walter Stewart and brought his bride to the old homestead, and it was there that my father, Richard, was born in 1824, his death occurring in 1911. I, too, was born at Belvedere in 1872, and it was in this historic old place on the Genesee River that the pistols and the many interesting letters were kept for three generations."

During the Civil War, Richard Church organized a volunteer company and, owning no side arm of his own, he had one of the Burr-Hamilton pistols converted to percussion from the original flint. Fortunately, only one of the pistols was converted. In 1930, Colonel Church's granddaughter sold the two cased pistols to the Chase Manhattan Bank, where they have resided either in the bank's museum or vaults ever since. It was on the occasion of the U.S. Bicentennial anniversary that David Rockefeller, Chairman of the Board, generously gave permission to the U.S. Bicentennial Society of Richmond, headed by historian Virginius Dabney, to remove the pistols from the vault and have them reproduced. The reproductions, which have been made with complete fidelity to the original surviving flintlock, were made under my supervision by the Italian gunsmith, Walter Agnoletto, who restores ancient arms for museums all over the world.

We had to take the original pistol completely apart to authenticate the reproduction. It was when we removed the lock from the stock that the long-kept secret of the concealed hair trigger came to light.

Burr dons cape, pistol in hand, as Hamilton is propped against a tree, a bullet lodged in his spine. Hamilton died the next day, and maintained that he did not plan to shoot.

advertising section next 8 pages

Getting more for your money is just one good reason to shop by mail from Norm Thompson!

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When we say "You be the Judge™" we mean just that! Every product you purchase from Norm Thompson must live up to YOUR expectations, not ours. If at any time a product fails to satisfy you, return it to us, postage prepaid, and we'll either replace the item, or refund your money in full, whichever you wish.

This is definitely not a 2-week guarantee. It's good for the normal life of the product. (You being the judge of what that normal life should be.) We'll stand behind everything we sell to the fullest extent . . . no ifs, ands, or buts.

For people who are still individuals . . .

the original Irish Country Hat.

Each Irish Country Hat is the creation of an individual, not a production line. Irish craftsmen take the raw wool of mountain sheep, weave it into nubby wool tweed, and then hand-cut and sew each hat separately. No two hats are exactly alike because each artisan has his own way of doing things. Natural lanolin in the wool helps shed rain, while the full brim protects you from the sun. Inside, the hat is fully lined.

Shape your Irish Hat to suit yourself.

The shape of your hat can say a lot . . . that's why the final shape is left up to you. (We'll include instructions on shaping and care with each hat.)

Colors: Grey or brown tweed mixes (Men **G1200B**) Sizes 6½-8. (Women **G1209**) Sizes 20¼-25 . . . . . **$16.50**

Pure Irish tweed . . . hand cut and sewn one at a time.

Solid brass kerosene lamps from the coal mines of Wales . . .

an uncommon collector's item that's remained virtually unchanged since the mid 1800's.

This is definitely **not** a "lightweight" reproduction. It's the real thing . . . crafted from more than three pounds of solid brass in a way that's remained virtually unchanged for more than a century.

Lamps like these have played an integral part in the life and livelihood of Great Britain's coal miners and are actually responsible for saving thousands of lives.

Originally used as a safety device.

At first glance it may appear that the lamp's primary function was that of a light source. Although it gives off light in much the same manner and intensity as the early-American hurricane lamp, its most important function was the detection of methane gas. By reading variations in the light given off by the kerosene wick, an experienced miner could actually tell when a dangerous level of methane gas was present. It was one of the most remarkable advancements in mining safety ever developed. In fact, it was so sophisticated for its time, many are still being used in the mines today.

A handsome addition to any setting.

The lamps measure 10" in height, 3½" in diameter, operate on kerosene and burn a standard size wick. Each is equipped with a solid brass hook for hanging or it can be set on a book shelf, coffee table, desk, mantel, fireplace hearth . . . the list is endless. They blend beautifully with your prized antiques and equally well with the most modern interior designs. Not only will they add a special "character" to your home or office today, but we honestly feel their value as a collector's item will increase with time.

A beautiful and unique gift.

As a gift, our solid brass miner's lamp would be cherished and remembered for a lifetime. Because it's solid brass (not plated) it can be easily engraved to commemorate a special occasion or just to express a special sentiment. Along with each lamp, we'll send complete operating instructions and a fascinating detailed history.

No. G9300 . . . . . **$67.50**

"ESCAPE from the ordinary"®

Order form inside

Genuine harness leather combines with a solid brass buckle in a darn good belt for $11.50!

Handcrafted

This belt is made the way a good belt ought to be made . . . to last a long time. It's crafted for us by Coach® Leatherware. They've been producing some of the world's finest leather products for over 30 years. They devote all the time, care, and skill necessary to insure that you get the highest possible quality. Heavy duty stitching joins two plies of tough harness leather. It's soft to the touch yet amazingly strong so you won't have to worry about it stretching out of shape. The beautiful leather is accented by a solid brass buckle. Two strong snaps secure it in place (and let you change buckles as you wish). Even waist sizes: 30-42. Color: Rich golden tan. Width: 1½". **No. G248 . . . $11.50**

The Apollo . . . a 10 ounce reversible jacket that keeps you warm when it's cold and cool when it's hot.

One of the most useable jackets you can own.

The Apollo jacket is one of the most practical jackets we've seen. It was made possible by a fabric developed for use in space suits . . . a tough aluminum skin bonded to durable 100% nylon. The result is a light, flexible fabric that reverses to either reflect or absorb warmth from the sun.

Reverse the Apollo to suit the weather and your comfort.

Wear the navy side out when it's cold. It absorbs warmth from the sun . . . and with the silver side facing inwards, your body heat is retained. When the temperature rises a little above the comfort zone, just reverse the Apollo so the silver side is out. It reflects the sun's rays and helps keep you comfortably cool.

Extra safety at night.

If you cycle for enjoyment or transportation, you'll appreciate the added measure of safety the Apollo provides when worn with the silver side out. It becomes a light reflector that's visible to drivers for over a city block at night.

More than its share of special features:

■ Tuck-away hood in collar pouch gives you extra protection in bad weather. ■ Button cuffs adjust to the wearer. ■ Air circulates through inserts of 100% nylon mesh under each arm. ■ Four pockets on both inside and outside. Pockets on silver side close with nylon zippers to protect your belongings. Pockets on navy side are open for easy access to contents. ■ All seams are double stitched. ■ Drawstring at waist lets you control the amount of ventilation you want. ■ Silver side is radar reflective. If you ever experience the misfortune of getting lost on a hike or hunting trip, the Apollo can be picked up on radar.

Color: Navy reversing to silver. Sizes: (Men) S, M, L, XL, XXL to fit 34-50. (Women) S, M, L to fit 6-20. Ave. length: (Men) 30", (Women) 28". **No. G6880** (Men) . . . **$32.00** 48-50 (XXL) . . . **$35.00** **No. G6889** (Women) . . . **$32.00**

Wear the navy side out to stay warm or reverse it to reflect the sun's rays.

Use it in your fireplace for delicious outdoor flavor anytime.

6 pages from your daily paper can cook a steak to perfection in less than 6 minutes.

Completely portable and you'll never spend another penny on fuel.

About 15 years ago, on our first trip to Africa, we saw natives in the northern frontier district of Kenya broiling meat on strange looking pots with holes in the bottom. Using rolled up balls of grass for fuel, they were really cooking up a storm.

Needless to say, we were intrigued. We did a little looking, and found that a British engineer stationed in Johannesburg had also observed this unusual device and perfected it by using a rolled steel barrel and newspaper. We know it's hard to believe, but this thing really does work. We like to call it the Zulu's answer to the microwave oven . . . only a lot cheaper version. In fact, if you consider the money you'll save on charcoal and lighter fluid in just one season, Norm Thompson's Shikari Grill will literally pay for itself.

Fast and efficient . . . the Shikari Grill cooks just about anything.

We guarantee it . . . a succulent steak, medium broiled to tasty perfection over live flames in just 6 minutes. There's no charcoal or lighter fluid to mess with, no waiting for coals to glow. Just crumple newspaper into a ball, light a match, and instantly you're cooking.

Steaks, hamburgers, hot dogs, chops, spareribs, fish and chicken . . . you can even boil water. Meat cooks in its own juices over scientifically controlled flames. (The Shikari Grill works on the principle of controlled combustion. Natural fat dripping over charred paper keeps the fire going.) You get better tasting food and it's actually more healthful because you use fat for fuel instead of eating it.

Compact and completely portable.

Norm Thompson's Shikari Grill comes in a compact heavy cardboard box that serves as a carrying case. It measures only 12"x12"x8" so it's really easy to take along . . . anywhere!

This is one outdoor grill you'll want to use year 'round. Use it in your fireplace for delicious outdoor flavor anytime. There's no need for forks or spatulas because the entire grid turns over rather than turning each piece of meat. And the unique "stay cool" handles simply don't get hot, so you won't even need hot pads. Best of all, since combustion is complete, there's little or no mess to clean up afterwards.

Order your grill today. You get everything you need . . . 3 section barrel, nickel plated grid, and instructions. **No. G9005 . . . $15.00**

Order TOLL FREE anytime

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Adds a distinctive touch to any auto interior . . . easy to install in 5 minutes.

Genuine sheepskin seatcovers for year 'round driving comfort.

Natural fleece keeps you cool and dry when it's hot . . . warm when it's cold!

Sheepskin was first used as a comfort aid hundreds of years ago by Mongol warriors who put hides over their saddles. Today, natural fleece seatcovers provide a unique yet practical answer to the icy cold or blistering heat of leather or vinyl auto upholstery. This winter you'll find the natural insulating properties of sheepskin will help keep you warm and comfortable. Next summer you'll discover just the opposite. The fleece will insulate against the heat to keep you cool and dry. You can even leave your car in the direct sunlight . . . the soft, natural fleece simply doesn't get hot.

Our sheepskin seatcovers are not only comfortable, but they're extremely good looking too. The soft white fur adds a touch of distinction to even the finest auto interior. They fit any car, bucket or bench seat and can be installed in 5 minutes. They're easy care, too. Dry clean or machine wash in cold water and air dry. **No. G9106** (bench seat) . . . **$32.50. No. G9107** (bucket seat) . . . **$32.50. 2 for $62.50**

Just about the nicest thing a man or woman can do for their feet...genuine shearling slippers.

Made in England . . . sueded sheepskin with soft, natural fleece.

Norm Thompson's genuine sheepskin slippers offer a great way to let your feet relax. All you feel is a continuous blanket of soft, warm fur. If you've ever walked on a sheepskin rug in your bare feet, you know the sensation we're trying to describe. It goes far beyond being simply "soft." These slippers for men and women are like having a sheepskin rug under you everywhere you go. Soft, warm, and comfortable . . . they cushion every step you take and protect your feet from cold, drafty floors. They're great for travel because they pack in a minimum amount of space. Once you've discovered just how comfortable they are, you won't want to leave them at home.

Velvet-like suede on the outside . . . expertly crafted throughout.

The outside of these slippers is almost as luxurious as the inside. Soft, sueded sheepskin is meticulously stitched to provide a near-perfect fit. The soles have been specially tanned for long wear, and a small heel has been sewn in to give you a little extra support. Our genuine sheepskin slippers are designed and crafted with one thing in mind . . . total comfort. **Color:** Light brown. (Men's) **No. G2060** Sizes: 7-14. **$23.00.** (Women's) **No. G2069** Sizes: 4-10½. **$23.00**

A unique British luxury . . . soft, warm and just plain comfortable.

The Connemara Tweed Jacket . . .

Sold only by us!

Made from the same handwoven wool tweed as our famous Irish Hats...available in America only from Norm Thompson.

A nubby, handwoven tweed jacket that seems to acquire more character the longer you wear it.

We found the forerunner of our Connemara Tweed Jacket in Ireland. It was being worn by our good friend Albert Millar . . . the man who makes our now world famous Irish Country Hats. The jacket he had on was actually fashioned from exactly the same fabric used in the hats. We asked Albert if it would be possible for him to supply us with enough handwoven tweed that we could offer a similar jacket in America. It took a lot of convincing, but he finally consented and now the Connemara Tweed Jacket is available exclusively from Norm Thompson.

A jacket designed to give you both practicality and great style.

We took the best lines of the so-called "Ivy League", and combined them with a deep single vent, wider lapels, and beautiful pocket treatment. The result is a traditional American jacket with the contemporary look of today . . . a jacket you can wear with just about anything from a dress shirt and tie to a turtleneck and casual slacks.

It has a clean, well-tailored look. That may sound like a small thing, but it's extremely important when it comes to getting the wear out of a sport coat that you should.

A jacket that ages with grace.

Because of the fine wool and the way this jacket is made, it's safe to say that it will probably outlast any other jacket of its kind. You'll be wearing your Connemara Tweed Jacket years from now.

A good, handwoven, all-wool tweed jacket like the Connemara becomes a part of you after a while. It molds to the way you carry your body . . . to your individual shape. The Connemara is one of those rare fashions that takes on character as you wear it. It ages gracefully, and will undoubtedly become one of your most treasured possessions.

Colors: Grey or brown. Even sizes: 36-50 (regular), 38-50 (long). **G6250 . . . $125.00.** (48-50) **. . . $135.00**

The Shaniko... a genuine shearling lambskin vest.

New this year and available only from Norm Thompson.

The Shaniko is a great example of a garment that's not only good looking, but extremely practical as well The supple suede will add a distinctive touch to just about anything you wear and the luxurious natural fleece will provide year 'round comfort.

An extremely efficient body warmer.

Experienced sportsmen know if you keep your upper body warm, you are less subject to chill all over. The Shaniko gives you this vital warmth where you need it most . . . over the chest and across the back, leaving your arms free for action. And better yet, it's a garment you can wear in so many different ways. It'll give you plenty of protection when worn over a wool shirt or under rain gear. We've even used it over a T-shirt and found it quite comfortable.

A completely unique look in suede.

The appearance of the Shaniko vest is not what comes to most people's minds when they think of shearling suede garments. The difference is what we call an "antique finish." The natural grain of the leather has been enhanced rather than covered up, producing a one-of-a kind look in suede.

Soft, natural fur.

The fleece you see inside the Shaniko is not a lining. It's simply the other side of the lambskin turned inside. It's trimmed to a uniform depth, but otherwise left completely natural. You'll experience breathing comfort and the luxurious softness of genuine fleece.

Color: Antique tan. Men's sizes: S, M, L, XL to fit 36-48.

No. G5195 .....**$85.00**

Timeless styling, luxurious comfort and great versatility in two of the most practical shearling suede coats we offer.

The Royal... Simplicity of design makes the Royal one of the most practical shearling coats you can own. The basic uncluttered style will probably never become obsolete and it'll complement most any attire . . . casual or dress. The Royal is a coat you'll take just about anywhere, from the football stadium to an elegant restaurant, with the confidence of knowing you're properly dressed for the occasion.

The Royal's simplicity makes it cost less too. It's easier to cut and tailor, and takes fewer hours to hand finish. Even so, you'll find we've taken no shortcuts in delivering luxurious warmth and comfort that'll last for a good many years to come.

The Royal is designed specifically for a man or woman. We don't just adapt one coat from another. This insures a perfect fit and lets each coat feel as good as it looks . . . with no bulk or binding . . . just solid comfort.

We've made only one change in the Royal's design during the past 15 years. That was the strap we added to hold the collar up in severe weather. We just hate to tamper with the great design of this coat . . . it's a classic in every sense of the word. Average length: 33". **No. G5190** (Men's) Even sizes 36-50 reg., 38-50 (longs). **$200.00, No. G5199** (Women's) Even sizes 6-20. **$200.00**

The Imperial... Expert tanners take premium lambskins and put them through 30 extra steps to attain the deep, silver-brown color that gives the Imperial its distinctive, distinguished look. It's also these extra steps that produce the super-supple texture found in this coat. We can only say that this is the result of master tanning at its best . . . producing what we consider to be the most luxurious finish we've seen.

Luxurious yet practical . . . generously cut for freedom.

The Imperial possesses a unique elegance you'll wear with pride. It was designed primarily for town and travel, but it's so adaptable you can team it up with casual and country clothes for a look that'll turn heads your way.

It may sound a little surprising, but this long coat has amazing action room . . . it's cut and tailored for shape. This eliminates the bulkiness you'd expect from a coat of this style, but still maintains its well-groomed appearance. The Imperial for men is cut full through the shoulders where a man really needs extra room. Our woman's coat is shaped and proportioned to flatter a figure. Both men's and women's have natural colored fleece inside, including the sleeves. Average length: 35". **No. G5180** (Men's) Even sizes 36-50 reg., 38-50 longs, **$240.00. No. G5189** (Women's) Even sizes 6-20, **$240.00**

Below, the Royal (left) and Imperial (right) . . . both guaranteed not to waterspot.

The Lady Spe

An easy you nee

Have you ever fo scattered throughou with your currency at literally hundre wallet/checkbook/c ■ A coin purse . . . strong snap. ■ A ful . . . no fumbling t license . . . fast, con leather saddle. ■ A for photos. ■ A po top or side stitched for your check reco

Colors: Golden ta blue, or black. **No. G3230 . . . $28.00**

Norm Thompson's exclusive Irish Cream . . .

The elegance of Ireland in soft, delicate 100% wool.

It took the creative genius of Irish designers John and May Hagarty to come up with this elegant, whisper-weight dress. To them, it represents yet another source of pride . . . to you, a luxurious fashion experience. The Irish Cream was designed exclusively for Norm Thompson from 100% Irish wool (completely natural and remarkably pure in color).

Caress your body with Irish wool and notice an important difference in quality.

The success of this dress begins with fine fabric . . . the Hagartys use only pure wool that is delicate, soft and almost sheer. It's this fine Irish wool that gives the fabric its light, silken texture . . . the aesthetic value that only pure wool can provide.

The Irish Cream is tailored with felled seams that can't unravel because they're folded over and double stitched. The outer seams are top stitched for appearance and to prevent the soft, delicate wool from stretching out of shape. You'll be proud to wear this rich looking dress that shows every sign of the quality tailoring that went into its making.

An elegant look that'll stay in style for years.

The three-button top of the Irish Cream . . . just above the point where the matching belt gracefully slims your waistline . . . is a rich, flat weave with an elegantly simple convertible neckline. Below the waist, the dress features distinctive horizontal bands of the same cream colored wool in a textured, nubby weave . . . the only trimming and a beautiful finishing touch. A handy side zipper (just under the left arm) lets you slip into this dress with ease.

A flattering dress . . . as practical as it is beautiful.

With the simple elegance of the Irish Cream you can be confident that you'll look your best at home or away. It's appropriate in the finest restaurant . . . or as a nice compliment to your own family at dinner. Even sizes: 6-20. **No. G3036 . . . $130.00**

Made of genuine 100% cotton sailcloth.

The Breton Cap for men & women.

Our Breton Cap is truly an international sport hat. We found it along the stormy coast of Brittany in Northern France. The sailors and townspeople of that particular region have been wearing it for generations. It's not only very distinctive, but also an extremely practical hat that'll withstand a lot of rugged use.

Crafted from genuine cotton sailcloth.

We've had our Breton Cap made with 100% sailcloth. This amazing fabric is so tightly woven that you can actually fill it with water and it won't leak. That should give you a good idea of the foul weather protection you can expect.

Sailcloth is easy to maintain . . . just give it an occasional brushing or scrub it with a damp sponge. It'll take one heckuva beating and show little or no wear at all.

A "fun hat" you'll want to wear often.

The uses for this cap are numerous . . . cycling, jogging, fishing, yachting, and more. A sturdy wide visor shades your eyes and a reinforced hat band provides a snug fit. **Colors:** Blue or red. Sizes: 6⅞-7¾. Men **(No. G1265) $12.00,** Women **(No. G1269) $12.00**

Superbly crafted fro genuine Water Buff

The "Space for men . . . the pocket

Our Space-saver is a compl organized to handle 12 cre large amount of currency. cards, stamps, or pictures ac venient wallet. A sturdy m

Holds plenty . . . yet fits ea

After trying one of these never go back to a heavy again. We've yet to discover compact wallet.

Expertly crafted from real v

The distinctive leather used is transformed by a proud g product that's obviously m tail reveals perfection . . . carefully folded and stitch finish on the leather itself.

Colors: Black or brown. Wt:

Special lower section cushions you take and provides amazing

acesaver . . . in ultra-soft cowhide.

r way to keep everything ed right at your fingertips.

great gift

ound yourself with checkbook, credit cards, photos, pens, and identification ut your purse . . . wishing you had an efficient way to organize them along and loose change? Searching for a solution to just such a dilemma, we looked ds of similar products. We finally found what we feel is the most useable coin purse/secretary of its kind. **Here's what you get:**

. on the outside where it should be. It's stitched securely and closes with a lly lined pocket for currency. ■ A place to keep six credit cards close at hand hrough your purse or plastic folders. ■ A window pocket for your driver's venient identification. ■ A handy ballpoint pen that fits securely in a sturdy . pocket for notebook. ■ Vinyl folder cket that accommodates either l checkbooks. ■ A pocket rd book. n, deep

One of the most practical form

Easy to pack, super strong, and holds an incredible amo

We've taken the basic duffle bag design and turned it into one of the most practical pieces of luggage you can own. Our Shikari Kit Bag is made of 100% cotton canvas . . . strong, yet very lightweight. It's a bag designed to withstand the rigors of camping, hunting, or a backwoods pack trip. And the Shikari is good looking enough for a city hotel or luxury resort.

Here's what to expect from this Norm Thompson exclusive:

■ **Packing is quick and easy,** even for large, bulky items. Jam-proof main zipper opens the entire length of the bag; side zipper opens a handy compartment for easy access to things you want to get at in a hurry. ■ **Checkable on all airlines,** ships, and trains. ■ **Virtually rip-proof** . . . stitched with dacron/cotton thread that won't rot. ■ **Water-repellent** . . . actually floats. ■ **Glove-soft leather carrying handles** . . . secured by an exclusive Safety Grip Lock. ■ **Rust-proof, jam-proof zippers.** ■ **Nickel end "D" rings** for lashing bag to car-top carrier or boat. ■ **Permanent calfskin name patch** for easy identification. ■ **Easy to store** when not in use . . . folds up compactly. Dimensions: 30" long; 15" diameter. Weight: 32 ozs. **No. G146 . . . $25.00**

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-saver" wallet
an end to
-buster!

An efficient wallet that'll fit in your shirt pocket.

ete wallet that's efficiently
dit cards (back to back), and a
two hidden compartments for extra
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streamlined wallets, you'll
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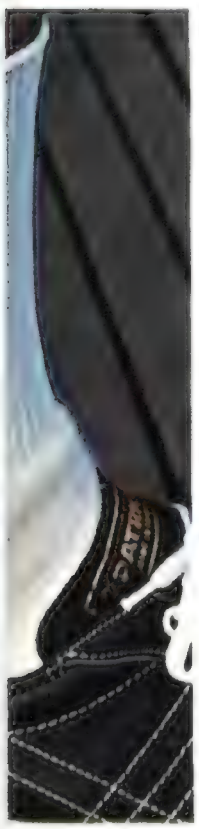
d edges, right down to the handsome

1¾ ozs. Size: 3"x4"x⅓". **No. G201 . . . $10.50**



very step support.

Solid comfort, honest support . . . like two pairs of socks in one.

Try 'em yourself for two weeks any way you like.

Order your socks today. When they arrive, slip into the soft, fleecy comfort and then go out and really put them through the paces. Handball, tennis, a round or two of golf . . . a week-long hike in the wilderness. Give 'em any test you want. If after two weeks, you're not completely convinced that they offer more comfort per dollar spent than any other socks you've worn, return them to us, postage prepaid for a full refund . . . no ifs, ands, or buts. You be the Judge.™

A bargain in comfort and support.

These socks will outlast 2 or 3 pair of regular sport socks. The foot and ankle portion is made from 65% wool and 35% nylon knitted on special machines to give the inside a soft, napped texture. It cushions every step you take and keeps your feet dry and comfortable. The upper portion is 98% stretch nylon and 2% elastic Lycra®. It provides firm yet gentle support and helps reduce swelling. Send shoe size. **No. G742 . . . 3 pr. for $8.50**

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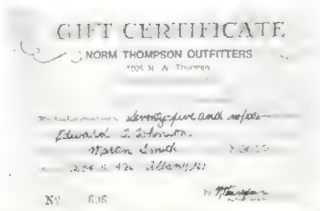

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We've taken the good looking, functional design of European walking shorts and combined it with American comfort and easy-care. Our Tyroleans possess every feature we can think of for practicality and long wear. They're fashioned from a rugged, yet unusually soft fabric called Tundra cloth. It's a special blend of 50% Dacron® polyester and 50% cotton. The result is a machine washable, machine dryable garment that rarely needs even touch-up ironing. Tundra cloth combines strong, man-made fibers that are highly spot and crease resistant with the natural good looks and cool, lightweight comfort of cotton. It breathes to keep you comfortable through warm weather, yet well protected in colder conditions.

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Colors: (shorts) beige, light blue, or white; (slacks) beige, olive or light blue. Slacks shipped unhemmed. Men's even waist sizes: 28-44. Women's even sizes: 8-20.

Slacks: (Men's **G4361**), (Women's **G4369**).....**$18.00**
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Norm Thompson's Pocket Sportsman.

A compact, handcrafted knife you'll use often.

Our Gerber Pocket Sportsman is truly one of the most convenient and useable knives you can own. It's small enough to carry comfortably in your pocket, but don't let its size fool you. It's a heavy-duty knife that will handle big cutting jobs, not to mention the little one's you run into every day. Here's what you can expect:

- 440-C stainless steel blade that resists rust, corrosion, and dulling. It's heat treated and tempered to hold a razor-like edge, yet isn't brittle.
- 2½" blade is "double wedge" ground to produce a superior cutting edge that's both sharp and strong.
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- Blade locks in the open position and won't jiggle or break away. Releases with a recessed thumb latch at the back of the handle. Length open: 6¼".

Weight 3 ozs. **No. G810** **$22.50**

Ultra-soft, genuine chamois in a trim, head-turning style.

A great fashion has to turn heads your way with outstanding style and basic good looks. It has to give you good fitting, good feeling comfort. And it must provide honest value for every penny you spend. This one does all of this and more! From start to finish it's crafted with an uncompromising approach to quality. It's the kind of garment you can take pride in owning and wearing.

Made of very special chamois leather from New Zealand.

We've been fortunate to obtain a limited supply of high quality chamois hides from New Zealand. There, a special breed of sheep (with the help of an ideal climate) yield a naturally supple, yet surprisingly durable leather. Each Chamois shirt requires six hides because only 8% to 10% of each hide has the right texture to meet our rigid standards. What's even more amazing is the fact that it takes an average of 60 sheep to produce those six hides. Only 1 of every 10 skins is accepted. The remaining hides are sold on the open market and usually go into garments that resemble ours in appearance only.

Excellence that simply can't be mass produced.

Norm Thompson's Chamois shirt is made by a small team of dedicated craftsmen who have been working with leather fashions most of their lives. They take a great deal of pride in their craft, which is still done almost entirely by hand. It takes a little longer, and it's a little more costly, but we're sure you'll agree that the end product is well worth it. Right down to the smallest detail, there's an obvious concern for perfection.

Completely washable and absolutely will not waterspot.

You can wash your Chamois shirt at home by hand or trust it to any drycleaner who accepts leather goods. And it won't waterspot, even if you get caught in a downpour. Color: Rich tan. Men's even sizes: 36-50, including longs. Women's even sizes: 6-20. Ave. Wt. 18 ozs. **No. G5820** (Men's) **$125.00; No. G5829** (Women's) **$125.00**

A handcrafted luxury . . . sold only by Norm Thompson.

Heavy-duty comfort in a very special blend called Schooner cloth.

The Vagabond shirt . . . sold only by us.

This is no city shirt It's a versatile, rugged, don't-give-a-damn shirt for fishing, camping, boating . . . just plain having fun. The Vagabond is made from a special blend of 50% cotton and 50% polyester we call Schooner cloth. It's similar to the fabric that sailors wore on voyages that took a year or more to complete. They needed clothing that was durable enough to last a long time.

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A real outdoor shirt in styles for both men and women.

The Vagabond is cut for action, giving you plenty of room to reach up and out. Our women's Vagabond retains the same rugged style of the men's version, but is specially cut for a trim, flattering appearance.

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A practical blend of 50% cotton, 50% polyester. Machine wash and dry.

For people who want to enjoy life on their feet.

Patricks for men and women . . . glove-soft leather, foam cushioning, and an arch support you can actually feel.

Better than just designed, Patricks are engineered for comfort. Everything that goes into them is there or a purpose. They're fashioned from glove-soft leather that conforms to every movement of your foot and are cushioned with foam everywhere it's needed . . . under the tongue, around the ankle, and from heel to toe beneath your foot. And that's only the beginning.

No gimmicks . . . just solid performance, comfort and support.

From the moment you put a pair of Patricks on, you'll feel something that most shoes of this kind lack . . . an arch support . . . one you can actually feel! That not only makes them great for active sports, it also makes them one of the best walking shoes you'll probably ever wear.

A direct import exclusive from France.

Under the foam insoles are dozens of specially designed air cells that cushion every step you take . . . you literally walk on air. The outer soles are comprised of hundreds of small suction cups. They cling to a wet deck or fast court and make it almost impossible to slip on any walking surface.

Other special features.

■ Slit for laces keeps padded tongue neatly in place. ■ Toes are gently squared for style, comfort, and plenty of action room. ■ Padded tongue and ankle collar make them equally comfortable with or without socks. ■ Easy care . . . just wipe clean with a damp cloth.

Colors: Navy, white, or brown. **Men's** sizes: 6-12, 13; **Women's** sizes: 5-10. Available in one width to fit A-E. EE order ½ size larger. Send regular shoe size for proper fit. **No. G2730** (Men's)**.....$28.50.** Size 13**.....$29.50. No. G2739** (Women's)**.....$28.50**

Tougher than blue jeans and a heckuva lot better looking.

Norm Thompson's Ranch Pants for men and women.

If your Ranch Pants rip, tear, wear through, or pull apart at the seams within six months of the date of purchase, we'll send you a new pair free or refund your money in full . . . no ifs, ands, or buts. Either way you risk nothing by trying them out yourself.

Rugged comfort that's more than good looking.

Ranch Pants are styled with a bold western flavor and made to withstand just about any kind of tough use you can give 'em. You'll enjoy the lightweight comfort of 50% cotton combined with the rugged durability of 50% Dacron® polyester. We think they're better than blue jeans for camping, hiking, riding . . . almost any outdoor adventure you have in mind. And what's more, they're completely machine washable and dryable.

Men's Ranch Pants feature two flapped back pockets that fasten securely for carrying valuables. The roomy front pockets are a full 10″ deep . . . ready to hold more than you'd expect. Seven heavy-duty belt loops handle belts up to 2″ in width.

Women's Ranch Pants are specially cut and tailored . . . not just adapted from men's pants. They're designed with a waistband snap, locking side zippers, and no back pockets for a slimming effect. (Men's and women's pants shipped unhemmed for easy adjustment to exact length.) **Colors:** Slate blue or tan. Men's even waist sizes: 28-50; **No. G4382 $21.50.** Women's: 22-30, 32, 34; **No. G4389 $21.50**

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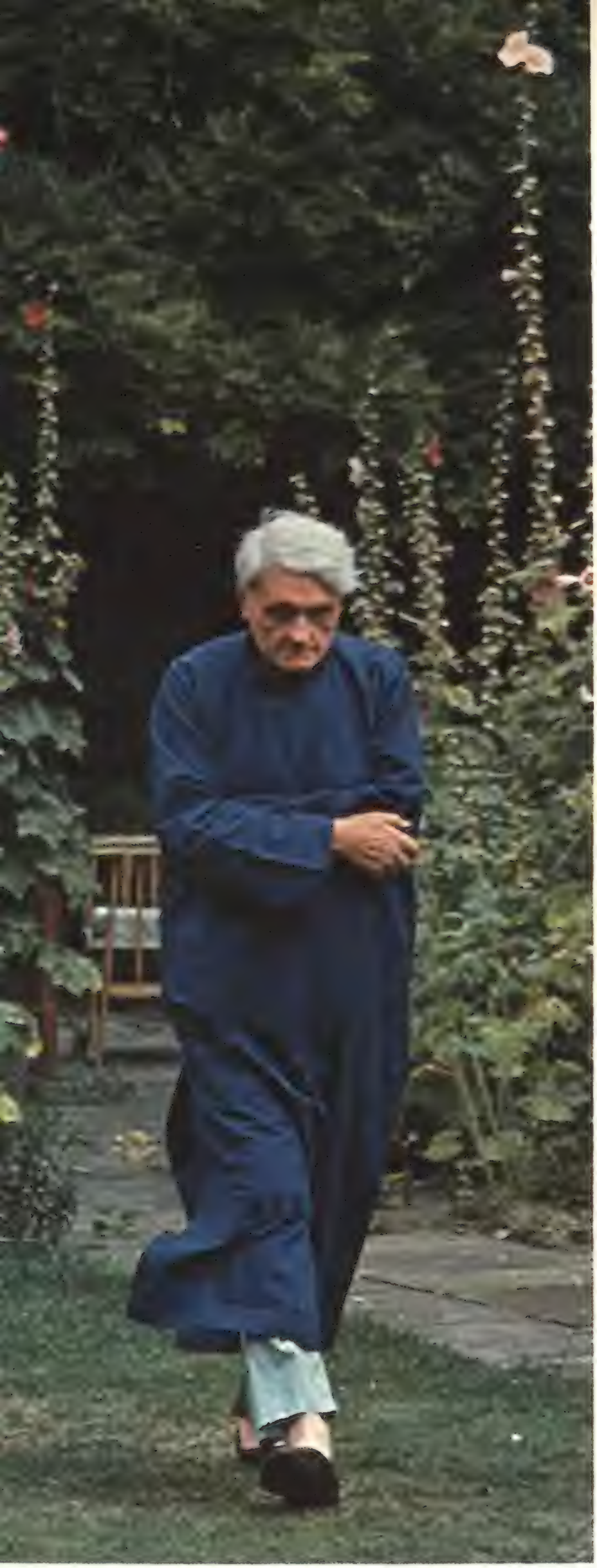

Strolling in Lodge garden, the Master wears a long, blue Chinese gown called a *ch'ang-kua*.

By Donald Gould

Joseph Needham, persistent prober of Chinese science

This British scholar has dedicated 30 years to the study of a civilization. His work should rank among world's most important

He is the kind of brilliant eccentric that England's two ancient universities at Oxford and Cambridge have always nurtured. As for the many opposing aspects of his nature, Dr. Joseph Needham, just retired Master of Gonville and Caius College, Cambridge, points to his half-French, half-Irish mother: "I'm very fond of wine, but I can't stand beer," he insists. Further, he manages to sustain allegiance to the Anglo-Catholic profession of Christianity while believing in the Marxist ethic.

Needham is also progenitor, chief editor and author of *Science and Civilisation in China*, a massive and encyclopedic work of scholarship. It has consumed the better part of his energy and genius over the last 30 years. The first volume appeared in 1954. Now four have been published and another is on the press. A further seven or eight are planned, some of them in several parts. Since the Chinese make up about a quarter of the world's population, and since Needham's magnum opus is the only such effort ever made to interpret the nature of the Chinese civilization to the rest of the world, it could be argued that the volumes issuing from the Cambridge University Press at the rate of about three per decade should be counted among the most important writings of our time.

Needham is 76, but younger in mind and spirit than many half his age. As he puts it, "I have little difficulty in computing the probabilities of my being able to correct the proofs of the last volume *in propria persona*." But whether or not he survives to see his

Needham and his wife Dorothy in the biochemistry laboratory at Cambridge University in 1925.

work completed, Joseph Needham bids fair to rank with men like Edward Gibbon, John Stuart Mill, and even his own hero, Karl Marx, as one who helped society comprehend its own nature.

Needham's father was a South London family doctor who became skilled in the administration of the anesthetic mixtures of those days, and who attended upon the great London surgeons to help with their longer and more difficult operations. The young Joseph was soon involved in this world. "I earned my first golden guinea at the age of 13 by assisting at an appendectomy. My father had destined me for medicine, and he wanted me to get used to things quite early. I remember it was done by Sir John Bland Sutton, who was a famous name, and I got my guinea for standing there holding the forceps."

Joseph was sent to Oundle, one of Britain's famous and ancient public (actually private) schools. He was there during World War I, and kept in touch with practical medicine during the school holidays. "They let all the medically qualified people go into the poor bloody infantry and take combat commissions, and they all got themselves killed off by 1916, so that people were simply screaming for anybody, qualified or unqualified, to keep the medical services going. And I found myself, as a schoolboy, spending my holidays working in an operating theater all day long. I was playing the part of a theater nurse—organizing catgut, passing instruments, and so on.

"I loved it. I enjoyed being with my father. I didn't understand too much of what was going on. But I think this early contact with practical medicine is one of the reasons why I never became a doctor myself. I had become familiar with the nature of surgery. I appreciated the great satisfaction to be had out of the carpentry aspect of it. Often enough your patient does get absolutely all right because of what you've done. You've achieved something tangible. It's like doing a job of carpentry at a very high level. But it lacked the intellectual interest I was looking for."

All the same, Joseph Needham went up to Cambridge with the idea of becoming a doctor, and he planned to study physiology and anatomy and zoology —proper subjects for a medical student. But his tutor said, "You can't do all that biology, my boy. It's impossible. The future isn't with that. The future is with atoms and molecules. Atoms and molecules—that's the future, my boy. You've got to do chemistry."

And that's what he did. At that time Cambridge was an exciting place for the natural scientist. People were beginning to try to interpret living processes in chemical terms. "This was more intellectually exciting than the old business of dissection and looking at things through microscopes, because, of course, you couldn't see the molecules. You had to deduce all kinds of things," he explains.

After graduation the young Needham was still willing to become a doctor, but it didn't happen. He was awarded a studentship in biochemistry to work in the Cambridge laboratory of Sir Frederick Gowland Hopkins, who won a Nobel Prize for his pioneering work on vitamins.

"Hoppie's lab was a sink-or-swim institute," says Needham. "If you didn't join the team with an idea already in your mind of what you wanted to do, then

Donald Gould, M.D., former editor of New Scientist, *frequently contributes articles to* SMITHSONIAN, *most recently on the World Population Conference.*

The Needhams enjoy wine before lunch on terrace of Masters Lodge with Lu Gwei-djen, at right.

you weren't his sort of person. If, on the other hand, you did have an idea, and he thought it a good idea, he would back you up to the hilt."

Needham had an idea, all right. He told Hopkins that he believed the chemical events in the developing egg must be "absolutely thrilling. It must be a great chemical factory." Hopkins was immediately enthusiastic, and for the next three years Needham worked on the PhD thesis which was to be the foundation of his own scientific reputation. He pioneered the serious study of chemical embryology—the chemical happenings accompanying and mediating the anatomical changes in developing organisms.

With his PhD in hand, Needham was elected to a research fellowship at Caius, the college he was later to head as Master. "This was very extraordinary," he explains, "because in those days there were only 20 fellows, even less, and yet the college council, in some extraordinary fit of absentmindedness, went and elected two young biochemists on the same day!"

This "extraordinary" happening helped seal his fate, because a fellow is provided with bed and board and a stipend. "It meant that I was not then going to have to get a medical degree in order to make my living. It was obvious that I would be able to go ahead in pure science for the rest of my life."

But he has some regrets. "I'd like to have qualified in medicine. I think the clinical experience does something to you psychologically, and makes you a person apart. You gain an extra dimension of understanding, and an extra dimension of compassion, too. So I am sorry I never qualified, but on the other hand I do not believe in quarreling with the Tao. I believe the Tao has a pattern for everybody," he declares.

Thus Joseph Needham remained in the academic atmosphere of Cambridge and, in 1924, the year in which he took up his fellowship, he married "Dottie." Dorothy Mary Moyle, four years his senior, was also a biochemist working in Hopkins' laboratory. A specialist in muscle chemistry, she is herself a scientist of international repute, becoming a Fellow of the Royal Society (the supreme seal of scientific virtue in Britain) in 1948, seven years after her husband. Indeed, apart from Queen Victoria and Prince Albert, who were similarly honored but for slightly different reasons, they formed the first husband and wife pair to share this distinction. In 1972 Dorothy Needham published her own magnum opus, *Machina Carnis: The Biochemistry of Muscular Contraction in Historical Development,* of which a critic wrote: "This is one of those rare occasions when a reviewer can hail a book of great and lasting importance." The work describes the discoveries and knowledge of musculature of the past 3,000 years. It illustrates the Needhams' emphasis on the historical approach, believing that an understanding of the development of science within a changing society is essential to the full comprehension of science and the scientific method in the world today. This attitude was born almost 50 years ago when Joseph Needham embarked upon his three-volume work *Chemical Embryology,* which set the new discipline he had established, and which became a classic.

"And that's where the history began to come in, because I felt impelled to put in the beginning of it a

long piece about the history of embryology. I wanted to show how it was that chemical ideas have gradually become involved with embryology, and how the problems of development have gradually been unraveled from the time of Robert Boyle and Thomas Browne in the 17th century. I started writing this in 1929, and it was published in 1931."

The Chinese connection began a few years later. Needham likens his capture by the Chinese influence to a Pauline conversion. In 1936 three young Chinese scientists came to Cambridge. "They had an enormous effect on me. I can only really describe what happened in terms of somebody else." And he goes on to tell the story of Michael Haggerty. "He was a bookbinder in California. I knew him in his old age. One day he was given a pile of Chinese books to bind. 'This,' he said to himself, 'is the most beautiful script and the most wonderful language ever invented. I just have to learn it.' And he did, and to such good effect that he spent the last 20 years of his life as chief translator from the Chinese at the Department of Agriculture in Washington. Like Haggerty, I started learning the language entirely as a hobby, without any idea that I would ever visit the country, and be called upon to study Chinese culture, and then explain it to the rest of the world."

A few years later Needham did go to China, but not of his own initiative. "In 1942, a very gloomy point in the war, Sir George Sansom, who was a Japanologist and a career man in the Foreign Office, said 'We must send somebody to China to cheer them up, and go around the universities, and so on, and we need one arts man, and a Fellow of the Royal Society.' Well, there was hardly anybody except me in the Royal Society who could read Chinese, and since I was, after all, only an embryologist and a biochemist, I was fairly expendable, and so I went."

Needham is ceremoniously given an honorary degree in literature at University of Hong Kong in 1974.

Needham became head of the British Scientific Mission in China and counselor at the British Embassy in Chungking, where he was later joined by Dorothy and by Lu Gwei-djen. The latter, daughter of a Nanking apothecary, had been a member of the 1936 Chinese "invasion" of the Cambridge labs. Since then she has been a central figure in the Needham saga, now being his assistant and chief collaborator.

For four years Needham and his team formed an essential link between the Allies and the scientists and technologists of a besieged and isolated China. "Before we got there the only contact had been through the diplomatic service. But the third secretaries and so on knew nothing about science or medicine and it was a shambles. It was obvious that we ought to set up a Sino-British science cooperation office, and so we did. The ambassador backed the idea to the hilt, and we had everything organized, including our own headed notepaper, long before London had got around to giving permission for the scheme. But that was the way you had to work. London finally had to agree to what was more or less a fait accompli." Needham traveled all over free China visiting hospitals, arsenals, universities, government labs, mines, factories, railway centers and every kind of place where science and technology were employed, "finding out

During World War II he served as diplomat in China, bringing supplies into then isolated country.

what they were stuck for. In some arsenal, for example, you might find they'd broken the most essential part of their metallurgical microscope, and then you'd telegraph back to London for a replacement."

His mission supplied the Kuomintang and Communists alike—for, although the two factions fought a great deal on the borders between their respective territories, they were supposed to be in alliance against the common enemy, Japan, and the Communists actually had a bureau in Chungking. Needham had space reserved for his needs in the Royal Air Force planes that maintained contact with China, flying in from Burma over "the Hump." "This way we were able to keep them more or less supplied with anything from white rats to drugs—and books. Lots and lots of books."

Needham has a favorite boast. He claims much of the credit for putting the S (for "Scientific") in UNESCO. "I kept sending memoranda around the world from Chungking about the need, and it was approved eventually. Julian Huxley got a cable from Ellen Wilkinson [then Britain's Minister of Education] asking him to be first director general. He straightway telegraphed me, so I left Chungking to become UNESCO's assistant director general for Science, and established the department." Two years later Needham returned to his readership in biochemistry at Cambridge, and his fellowship at Caius. It was at this time that the great work began in earnest.

The seed had been sown some time before. "The more I had got to know those Chinese friends of mine in Cambridge, the more I felt how exactly like myself they were. So then the question was obvious. If modern Chinese scientists are just like us, how did it come about that the scientific revolution, with Galileo and Torricelli and all those chaps, happened only in Europe and not in China? That problem was really the start of it all. But behind it there is yet another and extremely intriguing question. Why, during the previous 14 centuries, had the Chinese so often been ahead of Europe in science and technology?"

'One unitary science of nature'

The volumes of *Science and Civilisation in China* published so far, and numerous additional essays and dissertations, have been concerned with these questions. But throughout them runs an additional theme. Needham believes there is "only one unitary science of nature," and that the existing body of natural knowledge has accumulated continuously over the millennia. Various peoples have made different contributions at different times. In pursuance of this belief Needham has sought to show how the numerous skills and technologies developed by the Chinese far in advance of the West (from building suspension bridges to designing clock escapements) were transmitted from Orient to Occident, forming the foundations of Renaissance science.

Others have doubted the validity of Needham's approach. Einstein, for example, would not have thought Needham was asking the right question concerning China's recent scientific history, for Einstein believed the wonder was not that China *didn't* beget the scientific revolution, but that the West did. Kurt Mendelssohn, an eminent Oxford physicist, has questioned the proposition that the corpus of Chinese technological achievement was inherited intact by the West, pointing out that it is perfectly possible for even the most ingenious of inventions to be repeated, later and quite independently, in another place, and reminding us that even within our own Western civilization important discoveries have been completely lost. "If Columbus had known the correct radius of the Earth, measured with considerable accuracy by Eratosthenes in 200 B.C., he would never have persuaded Ferdinand and Isabella to allow him to reach India by sailing west."

However this may be, nobody will deny that Needham is responsible for dispelling the view of China as a feudal and backward society. In Mendelssohn's words, Needham has, "with a unique combination of

energy and scholarship, opened up a hitherto unknown world; the world of Chinese scientific thought."

Two factors have helped Needham in his immense task. As an avowed near-Marxist ("I don't go all the way because I don't accept the Marxist criticism of religion"), he has been freely accepted as a friend by the Chinese authorities since the Communists took control of the entire country in 1949, and without this continuing entrée the work of the last quarter-century would hardly have been possible. (Peking purchases 100 copies of each volume of the work.)

Secondly, he has enjoyed the kind of support that only a few rare havens of scholarship like Oxford and Cambridge can provide. Since leaving UNESCO he has been able to devote most of his time to the project. He was determined not to return to the lab. "So it was a very fortunate thing, and it should be recorded, that my colleagues and their successors were extraordinarily long-suffering." He lectured, but that was all. "I was tacitly seconded, as it were, to the Oriental Faculty." In 1966 he was elected Master of Gonville and Caius, and no longer had to lecture in order to earn his keep. "It's meant a lot of psychological strain, and a lot of time spent on chairing meetings, and things like that. But I've found it's better to let everybody get on with their own job. I don't want to do more than the absolute minimum. I follow the famous maxim of taking no action contrary to nature, which generally means no action at all."

The college granted him time to work on the opus, as well as providing living and working quarters and free utilities. But all this ended with his retirement from the mastership this year. Then the entire operation was moved to what he calls the "mini-institute"—a modest building of the Cambridge University Press, called the East Asian History of Science Library.

Needham knows that in the past he has been regarded as "a rather dangerous fellow traveler, and very likely I still am." This was why, although the natural successor to Hopkins, he didn't apply for the Chair of Biochemistry when Hopkins finally retired in his eighties. Needham also believes it possible that his own university avoided creating a chair of the history of science because it is he who would have had first refusal "and that was the last thing many of them wanted." There was once talk of offering him a similar chair at University College, London. He is not resentful. "All things work together for good. I was left free for the job. I think the Tao knows what it's doing."

But there is one thing this acknowledged scholar-prince does resent, despite the esteem in which the world of learning holds him. He has been consistently cold-shouldered, he believes, by his university colleagues in the History of Science Department and in the Oriental Faculty. "There's been a wall of glass for years," he said, and believes it may be due to the varied academics in those departments who have little knowledge in his field, and so would be embarrassed by his presence were he offered some formal place among them. "People are only really happy when they can criticize something, and when they can tell what is really good work, and what isn't. None of the history of science people can read a word of Chinese, and none of the Orientalists know any science. You couldn't say either side was positively hostile, but they're certainly not friendly. If there were one or two large-minded people among them they'd have roped us in by now." As it is he has a sense of isolation, and regrets that his lifework will have to be completed in the new "mini-institute," unconnected with the university, except through the university press.

In fact, Needham seems to have had a fairly active working relationship with his historical and Oriental colleagues over the years, and they might be surprised to know how he has yearned for their warmer recognition. There may be another explanation for the lack of liaison he finds so hurtful. He is an individualist, first and last, as he showed in his Chungking days. He decides what he wants to do, and goes ahead and does it, and others may fit in with his plans as best they may.

He has a fiercely direct approach to problems of a kind likely to leave less single-minded and determined laborers floundering in his wake. "Sometimes people ask me how to write a book. I tell them that the thing to do is to choose a title, and then write the blurb, and then start at the beginning, and go on until you come to the end, and then stop."

At 76, but young in mind and spirit, Needham expects to publish many more volumes.

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In "Sleighride" we see a perfect blending of the talents of gifted artists and the consummate craftsmanship of Master Enamelers. Only Loup/Betourne of Limoges, France could create such a masterpiece. The world's finest and largest classic enamelers, the studio has not only the creative inspiration but also the artisans and facilities demanded for an endeavor of this scope. From original sketches to finished painting, it involved the special contributions of dozens of top talents. But with all their prodigious skills, they still had to limit "Sleighride" to an edition of just 100 plaques because the work was so exacting. One slip at any stage of the complex creative process meant the destruction of that whole painting.

Consider some of the highlights of the total effort invested in "Sleighride."

★ **Months of research and experimentation were required to produce the full palette of colors necessary for the subtle shading of the scene.**

★ **Detail so incredibly minute much of it had to be drawn by hand with the aid of magnifying glasses.**

★ **Countless hours of the most painstaking craftsmanship and handwork to attain complete perfection. The firing of the enamel alone consumed endless hours in a series of oven bakings with temperatures ranging from 1112 to 1832 degrees. Each stage had to be performed separately with supreme skill and patience. Error was simply not tolerated.**

Some astute collectors unquestionably will acquire "Sleighride" for its very promising investment potential. Classic enamel on copper is a vanishing art form. Each of these paintings is a unique and original work of art.

Jean-Paul Loup, however, feels that the greatest value of this masterpiece is in its tremendous stature as an original and important work of art. It is a painting to admire and enjoy, now and increasingly in the years to come.

The price of "Sleighride" is $950.00. Finished, framed size of each painting is 21½″ x 18½″ (plaque size 12¾″ x 10″). "Sleighride" is matted both front and back with a luxurious velvet especially selected to enhance the beauty of the painting. It is opulently dramatized by a magnificent 22 carat gold leaf frame.

A richly engraved title is affixed to each frame. Every enamel is numbered and signed and accompanied by a Certificate of Authenticity signed by Jean-Paul Loup.

If you wish to be certain of acquiring "Sleighride," please mail the coupon below. Jean-Paul Loup will send you a beautiful 8″ x 10″ color photo of the painting, full particulars and an order form. PLEASE DO NOT ENCLOSE ANY PAYMENT OR DEPOSIT.

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By Terry L. Erwin and Kjell Sandved

Chirp and rattle, dart and glitter!

A world of exotic creatures that achieve success through diversity is captured alive in the Smithsonian's new Insect Zoo

First you hear them, like the sounds of a warm summer day along the Appalachian Trail. Then you see them: creatures with piercing chirps and loud rattles, bizarre shapes and brilliant colors, penetrating eyes and darting movements. It's all part of the new Insect Zoo at the Smithsonian's National Museum of Natural History.

But don't stop at the entrance, don't be *entomophobic* (deathly afraid of insects). If you are entomophobic, the Insect Zoo will help you learn there is little reason to be frightened. Insects and their relatives are friends of Earth in many ways, and most of them are harmless (especially in the Insect Zoo, where they are all behind Plexiglas).

In 1974, Porter M. Kier, director of the National Museum of Natural History, and his scientific staff decided it was time to establish a new exhibit hall devoted solely to insects and their relatives. Why? No hall had ever before been given over to "bugs." And the public is coming to realize that eight out of every ten species on Earth are insects or their relatives, and that there are more than a million species of insects. We are now more aware than ever how much these creatures affect our lives: that more than ten percent of our crops are destroyed each year by insects; that more than 98,000 tons of delicious honey are made in the United States by bees each year; that millions of tons of the world's decomposing garbage are cleanly processed by scavenging "bugs"; and that without butterflies flitting in sunny meadows and crickets singing in the humid evenings, human life would be quite dull.

Upon entering the Insect Zoo, you are immediately drawn to the Arthropod Bizarre, a bazaar of bizarre living giants among modern day arthropods. You realize, then, that there is more to the exhibit hall than "insects." There are five common classes of arthropods: insects; spiders and scorpions; centipeds; millipeds; and crustaceans (such as crabs and sowbugs). Arthropods are animals with a segmented body, jointed legs and an external skeleton. Many kinds are on display in the Insect Zoo. A careful reading of the printed matter surrounding the Arthropod Bizarre gives perspective to the world of "bugs." The percentage of the world's animals that are arthropods (78 percent) is compared with other invertebrates such as snails, starfish and worms (16 percent), and with vertebrates such as frogs, snakes, monkeys and Man (six percent). A chart created by Beth Miles, the hall's designer, shows the length of time arthropods have been evolving on Earth (more than 500 million years).

With this knowledge, you are now ready to embark on an adventure through a living microworld of diversity—diversity in habitats, diversity in feeding techniques, diversity in life histories and diversity in structure, shape and color. The theme of the Insect Zoo is "success through diversity." Text and textbooks are provided in unique ways. While on your adventure you will come across not only printed text next to the animals and textbooks in a recessed library for your use, but also walking-talking "textbooks" in the form of volunteer docents. Zookeeper Sheila Mutchler recruits docent volunteers through the Museum's Office of Education, radio spots and the District of Columbia's "School without Walls." The docents tell visitors about the animals on display, and they feed the animals at scheduled times in view of the public. Zookeepers Lynda Richards and Bruce Daniels have chosen active, large arthropods for feeding demonstrations which stir great excitement among the visitors (and the volunteers who usually do the feeding).

With the repetitive rustling of the reddish rear wings of great lubber grasshoppers coming from across the room, you continue through the world beneath the surface of a marshy pond. Water beetles and damselfly naiads, immature dragonflies and water scorpions gracefully move in their watery world of suspended oxygen. Each has special ways of breathing: the water beetles capture bubbles of oxygen from the surface on specialized hairy patches or under their wing covers, the naiads have gills, and the water scorpions use a strawlike device reminiscent of James Bond hiding underwater breathing through a reed.

A curator in the department of entomology, Dr. Erwin doubles as adviser to the Insect Zoo.

Suddenly your eye catches movement on the nearby pond surface. You find yourself alongside a living ecological transect, some 50 feet long, with a pond at one end, a grassland in the middle, and a forest at the far end; a sign overhead says WHERE ARTHROPODS LIVE. Again your eye picks up movement on the pond surface. It's a whirligig beetle, another, a third; the pond is teeming with them! These strange beetles have two pairs of eyes, one pair modified for watching above in the air and the other for watching below in the water. Their legs are highly modified oar-like devices which allow the beetles to swim erratically and rapidly. Usually they are searching for food or mates and often compete for food with the familiar water striders, also seen on the pond surface. Up the slope and around a large stone lives a colony of ant-lion larvae or doodlebugs. These strange-looking creatures with long, tonglike jaws (mandibles) lie in wait for prey at the bottom of small conical pits made in sandy or dusty soil. Passing ants or other insects sometimes walk along the edge of the pit and lose their footing, tumbling to the bottom where they are impaled on the doodlebug jaws, then drained of their life fluids. Doodlebugs dig and maintain the cone-shaped pit with quick flips of the concave head as they turn in a circle. Sand and dust are cast up and out, evenly forming the symmetrical pit—an elaborately styled but simple pitfall trap of the sort now used by entomologists to catch ground-dwelling arthropods.

There is so much going on in the large habitat enclosure that visitors often sit for an hour or more watching nature—close up. Alongside is a series of clear plastic enclosures, each illustrating how insects and their relatives have adapted to Earth's newest and most dominant species—us. Arthropod genetic flexibility and short life cycles have allowed them great latitude in adaptations and made it possible for them to invade new habitats, especially those made by human beings. You see cockroaches under the sink, sowbugs in the basement, Colorado potato beetles in the garden and termites in wooden structures.

Another chance for honeybees

Beyond the habitat section are two signs: HOW ARTHROPODS GROW and HOW ARTHROPODS COOPERATE. No story of insects would be complete without *metamorphosis* and *honeybees.* Arthropod growth is accomplished by molting, or shedding the external skeleton, but different groups have different ways of doing this. The classic case of butterflies is familiar to almost everyone. The process begins with an egg hatching to a caterpillar, the caterpillar pupating to a chrysalis, and finally the beautiful adult butterfly emerging from the chrysalis. In

A young visitor holds a "hickory horned devil," the five-inch larva of the royal walnut or regal moth.

These regal moths pupate on the ground without forming a cocoon. The wingspan may reach six inches.

Photographs by Kjell Sandved

The prominent horns of male scarab beetle attract a crowd. The female dug herself in under rotten wood.

other groups, such as silverfish, the young and adults look almost exactly alike.

Near the metamorphosis display is one of the most popular exhibits in the Insect Zoo—the observation beehive with its four tiers of honeycomb, marked queen, and hundreds of busy worker bees. The Smithsonian began a display of honeybees in 1926 and the First Lady, at that time Mrs. Calvin Coolidge, was a frequent visitor to the beehive, often bringing her friends. One day the bees swarmed and settled—where else?—in the backyard at the White House. The bees were soon evicted, and Mrs. Coolidge's interest in them cooled. For years after that bees were not exhibited at the Smithsonian. When, later, another colony was installed, the bees swarmed to a nearby air-conditioner; later still, in 1963, the resident colony fell victim to a "silent spring" because of heavy doses of insecticide sprayed on the Mall. The present colony in the Insect Zoo is seemingly quite happy, however, and is busy gathering spilled soda pop from the Mall's tourists.

After a look at the beehive and the excitement of finding the queen, your attention is diverted by small pieces of green leaves and yellow blossoms moving through long transparent tubes. On close examination you see that each piece is being carried by a small reddish ant. You have now discovered the most fascinating story told in the Insect Zoo—the story of the leaf-cutter or fungus ants. As in the beehive and termite colonies, these ants have a strict caste system with a queen, male reproductives, and workers that act as soldiers, scouts, nursery attendants, guards, and garbage collectors.

Each day fresh flowers and leaves are placed in a large enclosure connected to the ant nest by the transparent tubes. Scout ants discover the food source and make scented trails to the nest, where they "recruit" workers. At the food source, the workers cut pieces of petals or leaves and carry them back along the scented trail. The cut pieces are much larger than the ant, and would correspond to our carrying a 30-by-10-foot piece of wood board. Often small "police ants" ride on the cut pieces with their mandibles tilted, supposedly to attack enemies. The cut pieces are carried to a growth chamber which is temperature- and humidity-controlled by the ants themselves. Nursery-attendant ants "lick" each piece to protect it from growth of "unwanted" fungi; then the ants' own fungus is grown on the wilting pieces. By continually cutting the fungal filaments, the ants grow "Kohlrabi head," swellings of fungus rich in protein—their food.

As in any society, including our own, there is always leftover garbage. Among these ants, some workers are trash collectors. They usually dump the trash outside the nest in one place (unlike human litterbugs), which can be seen in the display at one corner of the food source enclosure.

Continuing through the zoo, you next come to a sign that says HOW ARTHROPODS EAT. Early in arthropod evolution, legs became mouthparts, and now, some 500 million years later, there is great diversity in use of these modified legs—chewing, sucking, filtering, sponging, rasping and slashing. Some highly specialized ocean-going forms do not even have mouth-

A couple reflects on butterfly mimicry and species that use it to deter would-be predators.

A colony of bees uses clear tube to get from their hive to flowers—and spilled soda—on the Mall.

parts; rather, they absorb nutrients through their skin. Each feeding method is described in filmed cartoons followed by filmed close-ups of arthropods actually feeding. Beside each film screen, the live chewers, suckers, filterers and others are seen doing their thing. With all these kinds of feeding behavior, there is scarcely any kind of organic matter that does not serve as food. There are even certain flies that live in jet fuel, and a beetle that bores holes in lead cables.

Next you see another sign, ARTHROPOD SIZE, SHAPE, AND COLOR; you are in the final section of the Insect Zoo. Curiosity draws you to a large black box labeled SIZE. Under movable magnifying glasses you see alive some of the world's smallest arthropods—mites, springtails and flour beetles. In front of you, there is a pyramid of mounted specimens ranging in size from beautiful beetles and bugs one-inch long to a three-foot spiny lobster. Press a button and the pyramid disappears as the ghostly image of a nine-foot Japanese spider crab, the largest living arthropod on Earth today, looms into view.

As with human beings, color plays an important role in the lives of insects. In the Insect Zoo you will see living displays of camouflage, disguise and mimicry. Monarch butterflies, so spectacularly colored with orange and black stripes, are almost perfectly mimicked by viceroy butterflies. Scientists have found that the monarch tastes bad to birds and frogs and other hungry animals. The viceroy gains protection because animals that have tasted a monarch will not, henceforth, touch anything with orange and black stripes.

Across from the monarchs and viceroys is another story of color, *cryptic coloration*. A yellow crab spider is poised in wait for prey on a yellow goldenrod. Visitors often need help to find the spider, the color blend is so good. Green katydids stand on green leaves and are equally difficult to find. A brownish rove beetle runs on soil of virtually its own color. These animals have evolved the coloration of their background, either to hide from predators or to hide from their prey. Nature puts simple principles to many uses.

Color is also used as a warning device. Reds, oranges, yellows and black are variously combined in rememberable patterns. These colors are usually combined with the arthropod's ability to sting (as with the Zoo's velvet ants) or bombard (as with the bombardier beetles which spray a toxic chemical at 212 degrees F, accompanied by a loud pop or hiss and a puff of white water vapor). Once a predator has experienced these nasty devices, it avoids certain colors and color patterns during food searches. Animals which adopt these colors and patterns are thus pro-

tected from experienced visually hunting predators.

Color and structure often go together. Green insects are often shaped like leaves or thorns (SMITHSONIAN, November 1974). Brown insects are sometimes shaped like wilted leaves or tree bark. Sometimes, though, structure takes elaborate shapes, as you will see next in the Insect Zoo's enclosure of rhinoceros beetles. Males have very long horns, one on the head and one on the pronotum, or second body region. These horns can be brought together like pincers and are used to "joust" with other males for females. The male beetles just push each other aside, however, and cause little harm to one another.

The last portion of your walk is more like a great leap backwards through time. A diorama of the Coal Age, the Age of Insects, puts perspective on the development of arthropod structure through time. It tells you how paleoentomologists re-create images of long extinct arthropods and their environments from often scanty fossil fragments. With these images of the past, scientists can better understand the present.

Although all the arthropods in the diorama are models of those living in the distant past, at least one is instantly recognizable: the cockroach, which represents a group of insects virtually unchanged externally in more than 300 million years. This durability, this continuity, brings to mind W. J. Holland's poetic vision of the future:

> When the moon shall have faded out from the sky, and the sun shall shine at noonday a dull cherry-red, and the seas shall be frozen over, and the icecap shall have crept downward to the equator from either pole, and no keels shall cut the waters, nor wheels turn in mills, when all cities shall have long been dead and crumbled into dust, and all life shall be on the very last verge of extinction on this globe; then, on a bit of lichen, growing on the bald rocks beside the eternal snows of Panama, shall be seated a tiny insect, preening its antennae in the glow of the worn-out sun, representing the sole survival of animal life on this our earth—a melancholy "bug."

As these thoughts of great spans of time and millions of generations of "bugs" fill your head, the murmurous sounds of the Insect Zoo's calling insects once more impinge on your consciousness. The chirps, buzzes, rattles and hisses rise in tempo, increase to a frenzied pitch; you realize that those are the calls of mating, of the endless perpetuation of arthropod species of countless individuals. Gradually, with a flicker of understanding, your eyes lift to the exit panel:

Some half-billion years ago
The (seg) (ment) (ed) worm turned . . .
It took a lot of crust and jointed legs
To borrow every changing shape and forge ahead,
Foot in mouth—yes, those are pearls
That were his thighs: see how they
Strain, chew, stab, suck, sponge
The produce of the biosphere!

Under sea lake pond stream, on dimpled
Surface film, over and throughout land,
In their largely small and teeming way,
Arthropods cut living fine,
Breed success, make up four-fifths
Of all existing kinds of animals,
Are often their own worst enemies.

John M. Burns

A gigantic dragonflylike insect resting on toppled fern tree dominates this portion of diorama depicting swamp of 300 million years ago, inhabited by insects like those we know today.

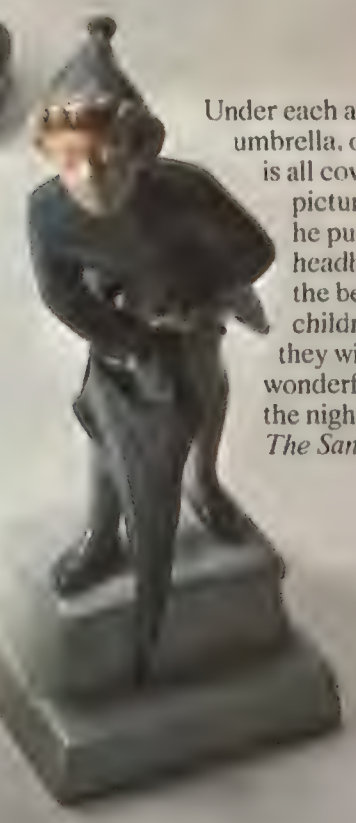
The Everlasting Magic of Hans Christian Andersen.

"Hello! Hello!" shouted Hans. "Here am I! And look what I found in the middle of the road!" He held up a dead crow for them to look at.
Clod Hans

"These are the trousers. This is the robe, and here is the train. They are all as light as if they were made of spider webs! It will be as if Your Majesty had almost nothing on, but that is their special virtue".
The Emperor's New Clothes

Everyone was dressed in their finest clothes and they all were looking at the little grey bird, towards which the emperor nodded very kindly. The nightingale's song was so sweet that tears came into the emperor's eyes.
The Nightingale

"Ten kisses from the princess", said the swineherd.
The Swineherd



Under each arm he has an umbrella, one of them is all covered with pictures, and that he puts on the headboards of the beds of good children, so that they will dream wonderful stories all the night through.
The Sandman

There sat the dog with eyes as big as teacups glaring at him. "You are a handsome fellow!" the soldier exclaimed as he put the dog down on the witch's apron.
The Tinderbox

The great story-teller himself as he looked in his youth on his first visit to Copenhagen. This figurine has been specially made for the Centennial of Hans Christian Andersen's death.

The lacquered shell of a walnut became Thumbelina's cradle, the blue petals of violets her mattress, and a rose petal her cover.
Thumbelina

Buy your favorite fairy tale. Better still - collect them all. They belong together. Handpainted under the glaze, these porcelain figurines by Royal Copenhagen are a lasting tribute to the greatest fairy tale writer of all time. There are 15 of them and the prices range from $ 29.50 to $ 445.-.

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By Jesse N. Bradley

A rebel officer's revenge, in spades, against the Navy

Over a little matter of back pay, Captain James Waddell conducted his personal war on the Union, destroying ships at sea

"It was the reward of my labor, it was my money, is my money yet, although the U.S. Government keeps possession of it. . . ."

That's how Captain James Waddell felt about his back pay; but in the early days of the Civil War, the U.S. Navy was not about to give a rotten secessionist rebel officer anything, even if it was a just debt. That was a mistake—one of the costliest blunders ever. The Navy should have paid him.

In the spring of 1860, James Iredell Waddell arrived at Hong Kong aboard the steamer U.S.S. *Saginaw*. He was an able and experienced professional naval officer who had given his country 20 years of dedicated, nonpolitical service. An orphan, reared in North Carolina by grandparents, he owned no slaves or property in the South.

However, the bitter political and social differences that were tearing apart the United States in 1860 could no longer be ignored, even on remote China station. The fierce personal inner struggle between love-of-state and love-of-country was as painful for a landless Waddell as it was for gentry named Lee. He could not choose the North, ". . . simply because, my home is the home of my people in the South, and I cannot bear arms against it or them."

In the United States, Abraham Lincoln was elected President. Secession was now certain. In Hong Kong, on December 15, Waddell transferred aboard the sloop-of-war *John Adams*, and began the long voyage home, as a working line officer. Once at sea, the ship was wrapped in newsless limbo, unaware that the United States was careening toward a bloodbath.

On April 12, 1861, Confederate cannon bombarded Fort Sumter and secession escalated into a shooting war. On July 21 at Bull Run, Northern and Southern armies met in a shoddily fought but full-scale battle.

The *John Adams* reached St. Helena in the lonely South Atlantic on November 20, 1861, and heard the sad war news. Lieutenant Waddell immediately gave his commanding officer a letter of resignation addressed to Secretary of the Navy Gideon Welles, ending his years of duty-bound life with one stroke.

The sea-weary sloop-at-war reached New York on January 11, 1862. The Navy didn't know what to do with an ex-officer who was neither Yankee nor rebel. At first, they dangled a good command as bait to get him to withdraw his resignation. Waddell refused. He had not been paid since before leaving Hong Kong, and all he wanted from the Navy was his money.

The Navy next offered him a hard choice: although he had committed no crime and was a U.S. citizen, he would be confined for the duration of the war unless he signed an oath agreeing not to bear arms against the United States. This was no choice at all. Waddell signed, under protest, but intending to honor the parole until he could appeal to President Lincoln. He was then allowed to go home to Annapolis. On January 28 he received a letter from Secretary Welles accepting his resignation and striking his name from the naval rolls. No money was in the letter. He concluded that the Navy's failure to pay him what was due had voided his parole oath. On March 27, 1862, at Richmond, Waddell was commissioned lieutenant in the Confederate Navy.

In the spring of 1863, after a long tour of shore duty, Lieutenant Waddell was ordered to Europe. By October 1864 the Confederacy was dying but not quite dead; and after two-and-a-half years in the Confederate Navy, Waddell had not inflicted a dime's worth of damage on the United States. However, the machinery of retribution was in motion.

On Saturday morning, October 8, 1864, a sleek three-masted steamer named *Sea King* dropped down the Thames River from London and turned southward into the English Channel. She had cleared for Bombay heavily laden with Cardiff coal.

The next morning at Liverpool the steamer *Laurel* slipped into the Irish Sea, cleared for Havana. Her camouflaged cargo was cannon, powder, shot and other supplies—enough to outfit a commerce raider for a 15-

Captain Waddell at wheel of his Confederate raider *Shenandoah*, with a grim eye out for Yankee prey.

Illustrations by Roy Andersen

A rebel's revenge

month cruise. Her disguised passengers, including Waddell, were the Confederate officers and a few selected English crewmen for just such a raider.

Once at sea, both ships left course and sailed directly for the Madeira Islands. *Laurel* arrived on October 16 and anchored in Funchal harbor. *Sea King* arrived off Funchal the night of the 18th. Both ships steamed a few miles to the north shore of Desertas Island. The ships were lashed together and the transfer of *Laurel*'s cargo began. After 13 hours of backbreaking toil the peaceful British merchantman had been changed into the famous Confederate commerce raider *Shenandoah*.

The first entry in the log reads:

> Oct. 19th, 1864. Having received everything from the Str. Laurel at sea, put ship in commission, as C.S.Str. "Shenandoah" and shipped twenty three (23) men as petty officers, seamen, firemen, and coal heavers. Weighed anchor at 2 oc [o'clock] PM and at 6 oc parted company with the Laurel when we hoisted the Confed. Ensign for the first time. 6:15 stood under steam to the SWd. . . .

Supplies had been dumped at random into every available empty space. Food, clothing, extra sails, rigging, small arms, cannon and shot were piled about on deck. The powder was stored temporarily in the captain's cabin. Coal was strewn everywhere.

More serious, the ship was very shorthanded. *Laurel* and *Sea King* had shipped extra-large crews, on the assumption that many would volunteer for the cruise. However, most of the seamen had no stomach for Navy discipline or the hazards of service on a fighting vessel. In spite of glowing words about good food, bonus pay, thrill of the chase, and helping in a glorious cause, only a handful volunteered. The final count showed 24 officers and 23 seamen—47 brave souls on a ship that needed at least 150 to sail and fight.

Waddell was stunned at this unexpected turn. He seriously considered canceling the cruise before it even started. But his young subordinate officers, when polled, voted unanimously to "take the ocean." They then shucked off their uniform jackets and cheerfully bent their backs to hoist the anchor. Waddell's revenge was under way.

For the next few days the ship coasted southward while officers and crew labored mightily to stow the supplies and clear the decks. New wire rope running rigging was reeved in, and the decks strengthened to take the weight and recoil of the main battery. The cannon barrels were mounted on their carriages and lashed down; however they could not be fired because no training tackles had been shipped. The fierce raider would have to rely on a harmless blank cartridge from a small 12-pound signal gun for her first warlike salvo.

More hands and, at last, real guns

Then, ten days after her commissioning, *Shenandoah* snared her first quarry. The laconic words of the log tell the story:

> October 30—. . . in chase of a bark which, at 1 p.m., hoisted the United States colors, when we hove her to by firing a blank cartridge and sent a boat on board, making a prize of her, she proving to be the bark *Alina*, of Searsport [Maine], from Newport (Wales) to Buenos Ayres with railroad iron; engaged transferring prisoners, their luggage and stores, from prize remainder of watch. From 4 to 6 p.m.: Having received everything from prize, at 4:15 scuttled her, and at 4:45 she went down; at 5 filled away on our course.

Alina was valued at $50,000, and her cargo was worth another $45,000. The rebel sailors stripped the ill-fated bark of needed supplies, including gun tackles and a mattress for the captain's cabin. More welcome, seven of her crew signed aboard for the cruise. *Shenandoah* sailed away, not quite so shorthanded as before, and with guns that could be fired in earnest.

On November 6, *Shenandoah* captured and burned the schooner *Charter Oak* sailing from Boston to San Francisco with a "general" cargo including welcome preserved fruits and vegetables. A small ship, she was worth only $15,000. Captives included the master's wife and her widowed sister and son.

Working on toward the equator, *Shenandoah* on November 8 snapped up the bark *D. Godfrey* bound for Valparaiso laden with beef, pork and lumber. Six of her crew joined *Shenandoah*.

On November 9, Waddell stopped the Danish brig *Anna Jane*. Her master agreed to set the prisoners from

Jesse N. Bradley is a historian and free-lance writer who lives in Huntsville, Alabama.

Flying the Confederate flag, under steam as well as sail, *Shenandoah* prowls the sea seeking Union prey.

the *Alina* and *D. Godfrey* ashore in Rio de Janerio.

A few hours later, the raider caught the New York brig *Susan,* 46 days out of Cardiff with a cargo of coal for the Rio Grande. The old brig was encrusted with barnacles and leaking badly. Her crew appeared to feel she would never make port, and seemed relieved when *Shenandoah* sped her along to an early watery grave. The prize board valued the old tub at an odd $5,436. Three of her crew enlisted for the duration of the cruise.

On November 12, after the first nighttime chase, *Shenandoah* stopped the clipper ship *Kate Prince,* sailing with a neutral cargo of coal to Bahia. She was American and fair game for burning, but her cargo was British-owned and exempt. Waddell bonded her for $40,000. This was a polite fiction where *Kate Prince*'s master pledged her owners to pay the Confederacy $40,000 for sparing his ship. He also agreed to take *Shenandoah*'s prisoners to Bahia.

The next day the raider snared *Lizzie M. Stacey* bound for Honolulu with salt, iron plate and knocked-down soft-pine barrels. With the barrels for kindling, she burned quickly. She was valued at $15,000 and her crew of three joined *Shenandoah's* growing roster.

On December 4 near Tristan da Cunha, Waddell captured the bark *Edward,* a smelly old whaler so well provisioned it took two days to pick her clean. She was valued at $20,000, and her beef, pork, biscuit, rope and whaleboats were invaluable to the raiders. The prisoners from the *Stacey* and the *Edward* were put ashore on Tristan da Cunha.

After leaving the island, the *Shenandoah* was put under sail and the propeller pulled up. Securing it, the engineer found a crack stretching across the coupling band. This was serious trouble: *Shenandoah* was not fast enough under sail alone to escape federal steamers. The ship must be drydocked to make permanent repairs, and only a few major port facilities were

open to a rebel commerce raider. Waddell could go to Capetown or he could make a hard 8,000-mile voyage under sail to Melbourne, which was on his route. Choosing Australia, he took a more southerly course to "sooner reach the strong west winds, which prevail in the belt which encircles the world south of the parallel of 40 degrees. . . ."

Christmas 1864 was cold and wet. There was a Christmas dinner, but "most of the dishes left the table for the deck."

On December 29, the lookout picked up a sail astern of the cruiser. The Confederates shortened sail to prevent the stranger's passing to the windward. She hoisted the enemy ensign; the *Shenandoah* raised the rebel flag and fired her signal gun. The bark was the *Delphine*, bound for Burma. The boarding party set her afire. Waddell added $25,000 more to his revenge tally, and picked up five additional seamen.

As was fairly common practice, *Delphine*'s master had his family aboard. His wife, their 6-year-old son, her maid, her canary, her trunks and her library were hoisted aboard the *Shenandoah*. The tall and lovely lady—younger than her husband—was also the daughter of the ship's owner; and for the next few weeks en route to Australia she tormented her unhappy husband, nagging constantly about losing her father's vessel, and flirting with the young Southern officers.

Wife of *Delphine's* master and daughter of her owner, this tall young lady flirted with her captors.

The *Shenandoah* reached Australia January 25, 1865, and received a mixed welcome. Many local people were sympathetic to the Confederacy, but Her Majesty's government tried to walk a narrow but legally correct line so as not to offend either the USA or the CSA. Waddell was permitted to put his ship in drydock for repairs. Then, under heavy pressure from the U.S. consul, the government reversed its position, and tried to search the cruiser for crew members hired in violation of Australian neutrality.

Four whalers caught in one raid

Waddell refused to allow the police aboard and claimed the right to immunity. The government moved up troops and artillery. For a while, trouble seemed certain—then the government backed down.

In the early morning of February 18, the rejuvenated raider made her way out of Hobson's Bay. Shortly after the pilot was dropped, 42 stowaways appeared on deck. Twenty had hidden in dry water tanks, 14 had nearly suffocated in the hollow iron bowsprit, the rest came from the lower hold.

On April 1, after several weeks of empty-handed cruising, the raider caught four whalers anchored in a sheltered harbor at Ponape. Prize crews were put into boats, the Confederate flag raised, and a shot fired. In less than an hour the whaleships were in custody.

Several days were spent transferring supplies to the cruiser, and personal effects of the crews; then the ships were given to the native islanders for further stripping. Finally, all were set afire.

On April 9, 1865, the war was over—for all except the handful of men aboard the *Shenandoah*. Captain Waddell was mercifully ignorant that his country was gone and with it his protected legal combat status.

For tedious weeks *Shenandoah* beat about the western Pacific, cruising ever northward through the lanes frequented by the rich China clippers, but taking no prizes. The climate grew colder as the tropics were left behind. On May 20, the cruiser sighted the northernmost of the Kuriles, snow-covered and bleak.

Shenandoah slipped through the Amphitrite Straits into the Sea of Okhotsk and coasted northward through broken ice for seven days. On May 27, the New Bedford bark *Abigail* was taken. The prize crew found nothing of value aboard except an extraordinarily large supply of whiskey and other drinkables.

Master's Mate Cornelius Hunt described what hap-

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Fourteen nearly suffocated Australian stowaways were hauled out of *Shenandoah's* hollow bowsprit.

pened next: ". . . and before the officers knew what was going on, a cask had been broached and the greater part of one watch were about as gloriously drunk as men well can be."

A second crew was sent over and promptly joined the party. The third boarding party, sent to return the drunks in irons, grabbed up cups and began drinking. All discipline vanished in a wild drunken spree: "There was not a dozen sober men on board the ship except the prisoners, and had these not been ironed it might have proved a dearly bought frolic."

Order was finally restored, and the drinkers, including several officers, returned to *Shenandoah*. *Abigail,* valued at $16,705, was put to the torch.

On June 22 *Shenandoah,* near the International Date Line and the Arctic Circle, began a final frenzied week of destruction. At nine o'clock in the morning, the lookout reported two vessels, and shortly after midnight the whaleships *William Thompson,* worth $40,925, and *Euphrates,* $42,320, had been caught, stripped and set afire.

The following day, also the 22nd, because the Date Line had been crossed eastward, the raider captured the *Milo.* Waddell bonded her for $46,000 on condition that she take his captives. He next threw a prize crew aboard the *Sophia Thornton,* then chased and caught the *Jireh Swift.* The former was full of whale oil and was worth a whopping $70,000. The latter, a fine, fast bark, was valued at $61,960. Both were burned and their crews stuffed aboard the jam-packed *Milo,* which was then dispatched to San Francisco.

On June 23, *Shenandoah* captured the brigantine *Susan Abigail.* The prize crew brought off a package of newspapers which told of Lee's surrender months earlier. However, these same papers also stated that President Davis had moved the Confederate government to Danville, Virginia, and had proclaimed that the war should be carried on with renewed vigor.

Waddell's revenge in high gear

Late in the afternoon of June 25, the *General Williams* was captured and burned. An estimated $44,740 went up in smoke. At 4:00 A.M. on June 26, the *William C. Nye,* worth $31,512 was set afire. A little later the $26,174 bark *Catherine* was boarded and burned. Next, the raiders caught and lit off *Nimrod,* worth $29,260. Waddell's revenge was in high gear.

The *Shenandoah* was now so full of prisoners no more could be safely taken aboard. Waddell put the overflow into 12 captured whaleboats and took them in tow in a long line astern.

This was a temporary arrangement. The next victim, the *General Pike,* was bonded for $30,000. *Gipsey,* worth $34,369, was burned next, then *Isabella,* valued at $38,000. Waddell returned to the *General Pike* and unloaded his accumulated prisoners. The *General Pike* was then allowed to sail for San Francisco.

The following day *Shenandoah,* under sail, slowly beat her way farther northward into the Bering Strait. Eleven ships were in sight, but the wind was strong enough to permit them to scatter and escape if alarmed. Waddell needed calm.

Wednesday morning, June 28, 1865, was clear and still. The 11 becalmed whaleships were now sitting dead in the water, unable to flee or fight. *Shenandoah* steamed slowly into their midst and raised the Confederate flag. The reaction aboard the whalers was immediate—anger quickly changed to despair as the hopelessness of the situation sank home.

The rebel boarding crews wasted no time. By midnight they had plundered and set afire *Waverly, Martha, Nassau, Isaac Howland, Covington, Brunswick, Hillman, Congress* and *Favorite,* a staggering $400,563 day's destruction. Two whalers, *James Maury* and *Nile,* were filled with 325 captives, bonded, and allowed to sail to safety. One account related:

> . . . and when, one by one, the burning hulks went hissing and gurgling down into the treacherous bosom of the ocean, the last act in the bloody

"I was wondering if I could possibly borrow a cup of Johnnie Walker Black Label."

12 YEAR OLD BLENDED SCOTCH WHISKY. 86.8 PROOF. BOTTLED IN SCOTLAND. IMPORTED BY SOMERSET IMPORTERS, LTD., N.Y., N.Y.

drama of the American civil war had been played. . . . amid the drifting ice of the Arctic seas; burning vessels formed a pyrotechnic display such as the children of men have seldom looked upon, while a grim and silent cruiser, that had, even then, no government nor country, and two weather-beaten whalers, filled with despondent prisoners, were the only audience.

Although Captain Waddell didn't yet know it, these burning ships were the last entry in the revenge ledger for his back pay. Thirty-two Yankee vessels had now been destroyed, worth $1,172,223—an enormous sum in those uninflated, hard-dollar times—ridiculously out of proportion to his few hundred in unpaid salary.

On July 1, sailing southward in a dense fog, *Shenandoah* slammed into a large ice floe. The hull was not holed, but in backing off, one of the chains was broken. Repairs were quickly made, but the incident clearly showed the hazards of Arctic cruising. The time had come to move the hunt to warmer climate and open water. On July 4, *Shenandoah* slipped through Amukta Pass in the Aleutian Islands into the north Pacific.

The California-Panama Isthmus ship traffic was a rich beckoning target. Even grander, Waddell dreamed up a raid that on the surface seemed madness but, in its sheer boldness, possibly would have succeeded. He would run into San Francisco Bay and hold the city for ransom under threat of bombardment. Prudence dictated that he catch a ship recently departed from San Francisco with news of the harbor's defenses.

On August 2, history at last caught up with the nationless ship. They stopped and boarded the British bark *Barracouta,* 13 days out of San Francisco, bound for Liverpool. The log describes what happened:

> Having received by the *Barracouta* the sad intelligence of the overthrow of the Confederate Government, all attempts to destroy the shipping or property of the United States will cease from this date, in accordance with which the first lieutenant William C. Whittle, jr., received the order from the commander to strike below the battery and disarm the ship and crew.

This was a bitter blow to the Southern officers. Their country was shattered in defeat, and the fate of their families was unknown. Furthermore, their actions since the war's end would surely be construed by a victorious and vengeful United States as piracy.

Time does not stop for disaster, and a ship cannot stay at sea forever. *Shenandoah* was running low on coal and food, and no longer could resupply from any unfortunate and unwilling Yankee blown across her course by the winds of chance. Waddell, now a civilian without governmental authority, but master of the vessel still, must decide which of all the unfriendly ports of the world would be the least unfriendly. The weary captain chose to take his ship back to England—even though it meant running a 17,000-mile gauntlet where every sighted sail was a potential captor.

On September 16 *Shenandoah,* bowling along under gale winds, crossed the longitude meridian of Cape Horn into the South Atlantic. Waddell kept her south of the normal shipping lanes and sailed farther eastward to avoid falling in with curious or deadly strangers. September 30, the weathered cruiser, flying northward, crossed her outward track and became the only Confederate ship ever to circle the globe.

Shenandoah made her last landfall as a Confederate cruiser at daylight November 5, and ran up St. George's Channel all day. After midnight, she picked up a pilot, and in a thick fog, steamed slowly up the Mersey River to Liverpool. At nine o'clock Monday morning, November 6, 1865, she dropped anchor near the British warship *Donegal;* and in an emotion-filled little ceremony, James Waddell hauled down the tattered Confederate flag.

Summing up years later, he wrote simply, "I claim for her officers and men a triumph over their enemies and over every obstacle which they encountered."

James Waddell stayed in England until the passage of time tempered stateside resentments. He returned to the United States in 1875 and was fittingly employed for several years as a ship's captain for the Pacific Mail Line. After retirement he was appointed by the governor of Maryland to direct the fight against oyster pirates in Chesapeake Bay. The grizzled old seaman died in Annapolis in 1886. He never did collect his back pay.

Last act of the Civil War: amid drifting Arctic ice, burning Yankee whalers made a pyrotechnic display.

By James S. Trefil

It's all relative when you travel faster than light

In the paradoxical world of tachyons, you could find yourself arriving before you left, and then deciding not to go after all

In the relativistic world near the speed of light, time itself appears to slow down. A tachyon,

How familiar the scene is. The handsome spaceship captain leans forward and snaps out a command:

"Ahead Warp 8, Mr. Chekov."

"Aye, aye, Kepten."

And the gallant starship *Enterprise* moves out at 512 times the speed of light.

Or how about that other favorite device of the writer—the hero who travels backward (or forward) in time to visit another age? Pure fiction, isn't it?

Or is it?

For the last several years, theoretical physicists have been speculating about the existence of objects which, should they ever be found, could conceivably make something like the *Enterprise* a reality someday, and might even have something to do with time travel. These hypothetical objects are called "tachyons"—"swiftly moving ones" (from the Greek root *tachys*, meaning swift). If they exist, they would have the property of moving faster than light. By contrast, all of the more mundane matter that we know about that moves at less than the speed of light would be lumped under the general heading of "tardyons," or "slowly moving ones."

Most of us have heard that it's impossible to move faster than the speed of light, and that this cosmic speed limit is somehow imposed by Einstein's theory of relativity. Does this mean that scientists now believe Einstein was wrong? Not at all. What the emergence of the tachyon idea means is that scientists have taken a closer look at the theory of relativity and have concluded that, under certain conditions, faster-than-light travel is not forbidden. But to understand how this conclusion has been reached, we'll have to understand exactly what it was that Einstein said in the first place.

People tend to accord the theory of relativity a kind of reverential awe. There is an impression that anything having to do with this particular theory must be so far out and complicated that only the most advanced scientists could possibly understand it. Perhaps the old chestnut about there being only a dozen men in the world capable of understanding it has contributed to this feeling. But the truth of the matter is that the basic ideas of relativity are not hard to grasp and, in fact, can be taught to today's undergraduates.

We've all had the experience of riding in a car or a train and dropping something, either intentionally or by accident. Strange as it may seem, just thinking about an everyday occurrence like this can lead us to

a particle moving faster than light, could even seem to travel back in time, with paradoxical results.

the principle of relativity. No matter how fast you are moving, 10 miles per hour in a car or 600 miles per hour in a jet, if you drop something it will fall right at your feet. The laws that govern the fall of the object *don't seem to depend on how fast you're moving.*

Let's look at this in a slightly different way. Suppose you are sitting on a moving motorcycle and a friend of yours is standing on the ground (p. 134). While you are watching the object falling straight down, what does he see? Well, during the time it takes for the object to fall to the ground, he will see the motorcycle move along the ground a certain distance. Consequently, he will see the object fall in an arc. You say it fell straight down, and he says it fell in an arc. This apparent contradiction is resolved by saying that each of you is watching the same event from a different point of view (the technical term is "frame of reference"), and therefore each saw something different.

What isn't so obvious, but is true nonetheless, is that if you and your friend were to make some measurements—you in the car and your friend on the ground—you would come to the conclusion that even though you see different things when you watch something fall, you agree on the basic laws that govern the fall. In other words, even though you see the object fall straight down and he sees it fall in an arc, you would both agree that the laws of nature which govern falling bodies (the ones first discovered by Galileo) were true. For example, in both cases the object takes the same amount of time to reach the ground.

And that is the Principle of Relativity! It states that no matter what frame of reference you are in, the laws of nature that hold for you are exactly the same laws of nature that hold in any other frame of reference. In other words, *every* point of view is correct, even though each point of view corresponds to a different description of what happened. This idea has profound philosophical consequences, and would have been anathema to a deeply religious man like Isaac Newton. But what does it have to do with the speed of light?

Up to now we've talked about only one law of nature, the law that governs falling bodies. There are many other laws, of course, and one set governs the behavior of electricity and magnetism. The speed of light (and of radio waves, microwaves, X rays and any other forms of electromagnetic radiation) is built into these laws. In this way, the speed of light is different from other speeds (like the speed of sound), and enjoys a special place in nature. It follows from this fact that if the laws that govern electricity are to be the same for every frame of reference, then the speed of light has to be the same for any two observers, even if they are moving with respect to each other. In other words, if you were on your motorcycle going 30 miles per hour and you flashed a beam of light at your friend on the ground, he would see the light moving at 186,000 miles per second and *not* at 186,000 miles per second plus 30 miles per hour.

Let's take the famous "clock paradox" as an example of the surprises that follow from relativity. Einstein is supposed to have come to the theory of relativity by imagining what would happen if you traveled away from a clock at the speed of light. If you think about it for a minute, you'll realize that if you did this, you'd always "see" the same position on the hands of the clock, so that as far as you were concerned, the clock would be stopped, even though someone standing next to the clock would see it moving as usual. This would happen because the light wave that carries the signal

The author, who has written on elementary particles for SMITHSONIAN, *is completing a book for laymen called* Physics Appreciation.

that says "it's 2 P.M." moves away from the clock as fast as you do, so when you looked, you'd always see 2 P.M.

Think about it a little more, and you'll realize that if you traveled a bit slower than light, it would appear that the clock had slowed down, and if you traveled a bit faster than light, it would appear that the clock was running backwards! In other words, what you see a clock doing depends on how fast you or it is moving, and two observers moving with different speeds will see the same clock running at different rates.

Is this result really so paradoxical? Actually, it's no more so than the fact that you saw something fall straight down while your friend saw it fall in an arc in our earlier example. What every observer has to agree upon is the fact that the laws of nature are the same, but individual events, like the ticking of a clock, needn't be perceived in the same way.

Let's go through the clock paradox in a slightly different way so that we can see how the speed of light comes into the problem. We could imagine making a clock in such a way that a "tick" of the clock would consist of a flash followed by the light traveling up to the mirror, bouncing off, and coming back to the receiver which, in turn, would trigger another flash (opposite). In principle, we could adjust this "clock" to tick once a second, or however often we wished. Now suppose you and your friend each have a clock like this, and you drove past him in your car. What would each of you see?

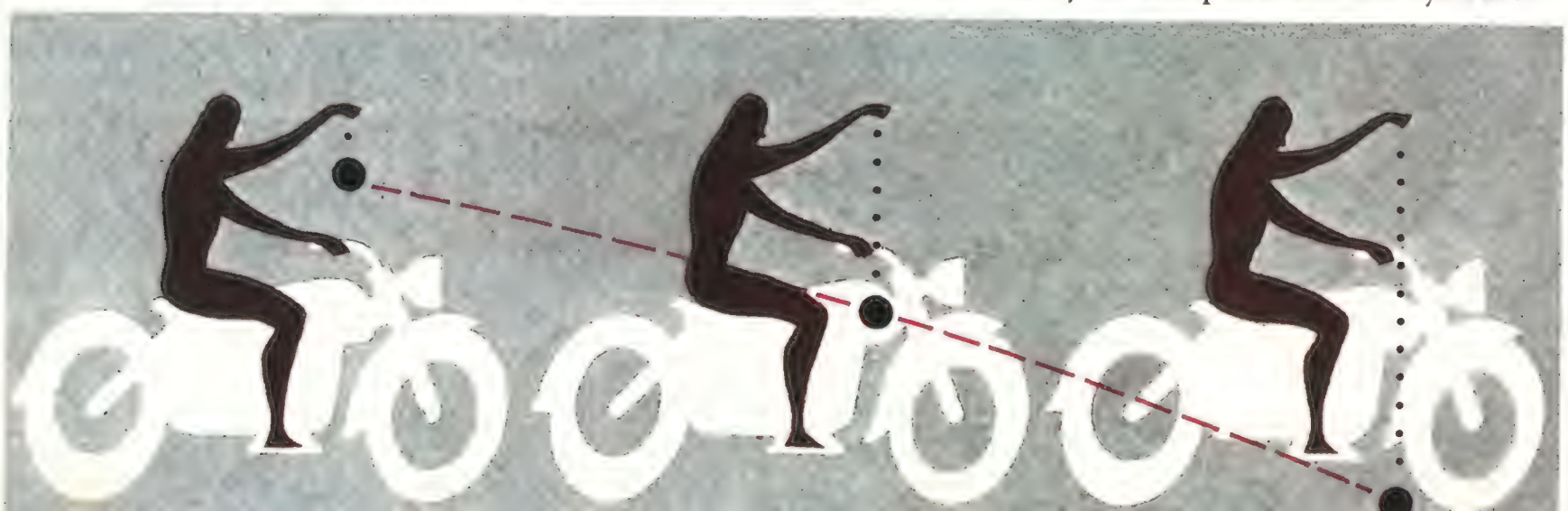
You'd see your clock working as usual, but your friend would see something different. Just as he saw an arc when you dropped something, he will see the light traveling as a sawtooth, because while the light from the flash is moving up to the mirror, the mirror will be moving with the car. Since light traveling on a sawtooth has to go farther than light traveling up and down, and since you both agree on the speed at which light travels, it follows that he has to see your clock slowing down compared to his. Again, no paradox, but a rather surprising conclusion following from relativity.

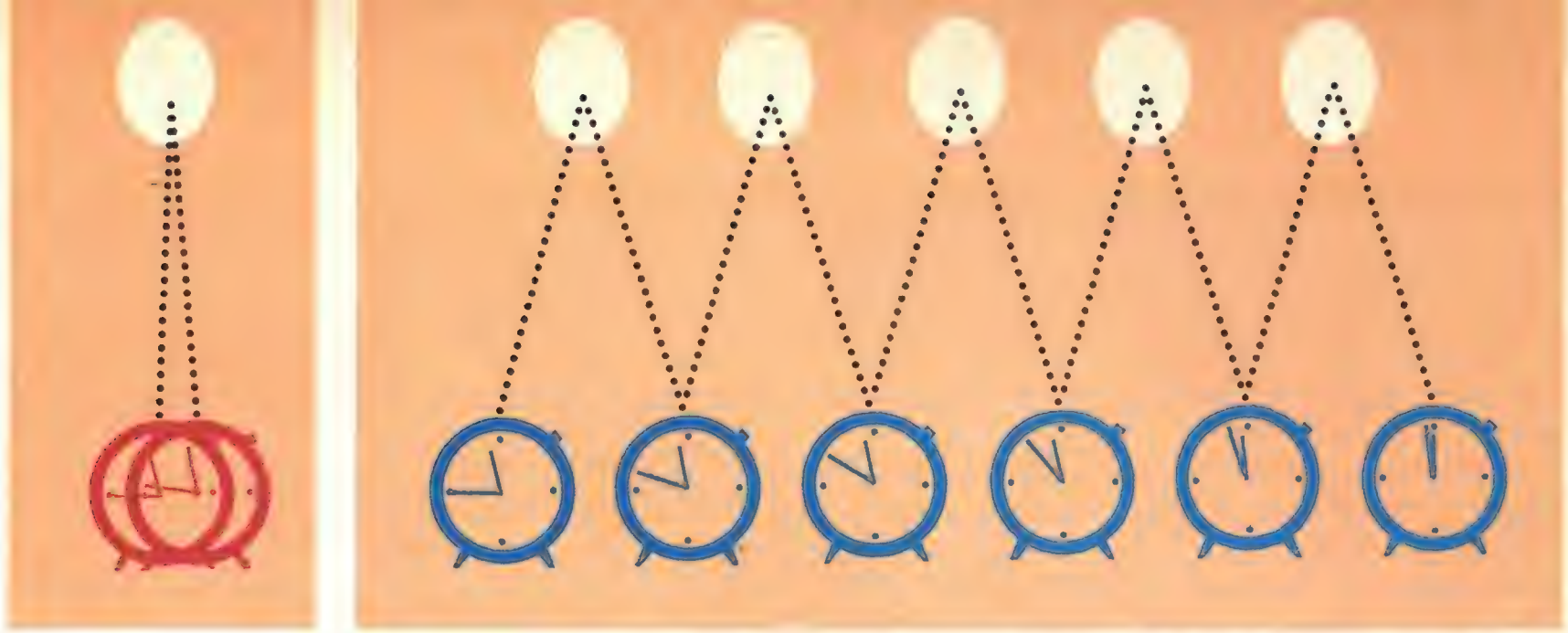
This result—that moving clocks appear to be running slower than stationary ones—is the idea behind the so called "twin paradox." If one of a set of identical twins goes flitting around in a rocket ship, and the other stays here, then when the traveling twin returns, he will be younger than the stationary one (p. 136)! It's hard to believe, but this difference has actually been measured by flying very sensitive clocks on airplanes.

There are other surprises in special relativity. It turns out that arguments based on the same principles as the ones we used in the clock paradox result in statements that virtually every property of an object changes when it moves. Its time slows down, its length contracts, its energy appears different and it gets heavier. This last property explains the conventional statement that faster-than-light travel is impossible, because if we try to accelerate an ordinary object to a high speed, we'll find it getting heavier as it goes faster. This means that we'll have to exert more force to get an equivalent increase in speed on a quickly moving object. As we approach the speed of light, we need more and more force, until we are just a hairsbreadth from it. To raise the speed that last fraction would require an infinite force. Since this isn't available in the universe, we have to say that if the theory of relativity is correct, no object now moving at less than the speed of light will ever be accelerated by conventional means to a speed greater than the speed of light. This argument is the basis for the usual statement that faster-than-light travel is impossible.

But it doesn't prove that at all, because the same argument could be used to "prove" that travel *at* the speed of light is impossible as well, and we know of at least one thing that travels at the speed of light—light itself. What the argument actually says is that things going at less than the speed of light (the things we've called tardyons) will always be tardyons, and that things now traveling at the speed of light will always

A dropping ball seems to be a perfectly simple event, but different people can see the same event in very different ways. Imagine the motorcycle is going 30 miles per hour. If we disregard wind resistance, the ball will appear to the man on the motorcycle to fall straight down. But to a man on the side of the road, the ball appears to move forward along the dashed arc. What you see depends on where you are.





These clocks emit a pulse of light that travels up to a mirror and then back to the clock, triggering another pulse. The clock at the left belongs to a stationary observer. The clock at right, originally synchronized with the one at left, is moving. The light has to travel farther, and so that clock appears to run slower than the stationary one. This relativistic effect actually happens to clocks carried on airplanes.

do so. There is nothing in the argument that says we can't go one step further, either. Suppose that somewhere in the universe there is something that actually travels faster than light—a real tachyon. From the theory of relativity we could say that such an object must always be a tachyon and must always have been a tachyon, but we can't say that such a thing is impossible. The fact that we can't turn a tardyon into a tachyon doesn't prove that tachyons don't exist, any more than our inability to accelerate a tardyon to the speed of light proves that light doesn't exist.

So even though there are lots of surprising ideas contained in the innocent-looking principle of relativity, there is nothing there that says that objects traveling faster than light can't exist. It just says that if they do, they always have to move at such speeds. A useful analogy might be two countries separated by a high mountain range. People live out their lives on one side of the mountains or the other, but no one ever crosses them. Philosophers on each side might even argue that no one lives on the other side, on the grounds that it is impossible to cross the mountains. But the main point, of course, is that it really isn't necessary to cross the mountains for people (though not necessarily people "like us") to exist on the other side. If they were there from the start, they're there now. The conjecture is that the world of tachyons and our normal tardyon world are like this—they are separated from each other by the speed-of-light barrier.

Modern physicists often quote something called the Gell-Mann dictum, named after Murray Gell-Mann, Nobel laureate in physics and a member of the Smithsonian's Board of Regents. It goes like this: "Whatever isn't forbidden is required." In other words, if there's no reason why something shouldn't exist, then it must exist. If we accept this idea, then we would have to conclude that there must be faster-than-light objects unless some reason can be found for denying them.

Actually, we've already hinted at what this reason might be when we talked about the clock paradox. You will recall that when we moved away from a clock face at more than the speed of light, the clock appeared to run backwards. This is a hint about one very important and puzzling property of tachyons and, indeed, the main reason that they were not accepted as a possibility until very recently: they seem to involve us in time travel.

Let's think about an experiment we might do if we could control tachyons. We could set up a tachyon transmitter at one point and a tachyon receiver somewhere else (p. 137, top). We could then send signals via tachyons, just as we now can send out signals with radio or light waves. The tachyon would leave the transmitter (which would use up some energy and give it to the tachyon) and, sometime later, would arrive at the receiver, which would then gain the energy that the transmitter has lost. The only way we'd know that we were dealing with a tachyon would be by noticing that the time it took to go from the transmitter to the receiver would be less than the time it would have taken light to travel the same distance. If the two were 186,000 miles apart, it would take one second for light to bridge the gap, while a tachyon might make it in half that time. But aside from this, there is nothing at all strange or paradoxical about the emission and reception experiment we've described.

The funny business begins when we ask how this experiment would look to other observers, say flying by in a spaceship and watching through the window. Remember, all points of view are supposed to be equally valid. Suppose there are two men in the rocket, each with a stopwatch. If the man in the front stops his

Illustrations by Clifton Line

watch when he sees the "receiver" activated, and the man in the rear stops his when he sees the transmitter activated, they can compare the times on their watches after the experiment. If the rocket ship is moving fast enough (but still less than the speed of light), they will find that the front stopwatch will have recorded an earlier time than the rear one.

In other words, the tachyon will be "received" before it is "transmitted." Furthermore, if they could measure the energy changes involved, they will see the receiver lose energy, instead of gain it, and they will see the transmitter gain energy instead of lose it. Surely there is no way of reconciling this sort of thing with any rational interpretation of relativity.

Actually, people thought until recently that this seeming inconsistency was a strong argument against the existence of tachyons. After all, one of the basic laws of nature is the principle of causality, which says that an effect must come after its cause. In this example, one observer sees events which follow this principle, and the other sees events which do not. Therefore, it was argued, the existence of tachyons is inconsistent with the laws of nature.

Well, not quite. Let's describe what the men in the rocket ship see in a little more neutral language. They see the apparatus which we called a "receiver" lose energy, and then, sometime later, they see the apparatus we called the "transmitter" gain energy. They wouldn't say that causality was violated at all, but that the man on the ground had got his labels mixed up. The thing which loses energy is what should be called a transmitter. Then their description of what they see is perfectly sensible: the transmitter sends something out, and that something is received at a later time. In short, they see the tachyon going the other way.

So each of the two sets of observers agrees that "effect" (the reception of the tachyon) follows "cause" (the emission of the tachyon). They both agree that the law of causality is valid as far as they are concerned. What they disagree on is which event is to be labeled "cause" and which "effect." Likewise, they disagree on what piece of apparatus is the transmitter and what is the receiver. This situation is analagous to the case of the object dropped from a moving motorcycle: the observers disagree on the description of events, but agree on the laws that governed those events.

Once we accept that, however strange the tachyon's behavior might appear, it does not violate any law of nature or of logic, the apparent backwards-in-time motion of a tachyon seen by some observers leads to another topic that science-fiction writers have elaborated on over the years: communication in time. Let's go back to our observers in the rocket to see how.

Suppose the man in the front of the rocket had a tachyon transmitter and the man in the rear a receiver just like the ones on the ground. Now suppose the man in front sends a tachyon to the man in back as soon as he sees the ground receiver interact with the first tachyon. To the man on the ground, it will appear that the tachyon in the rocket ship is sent by the man in back. If we choose the speed of the rocket properly, we can even have the tachyon in the rocket transmitted before the one on the ground.

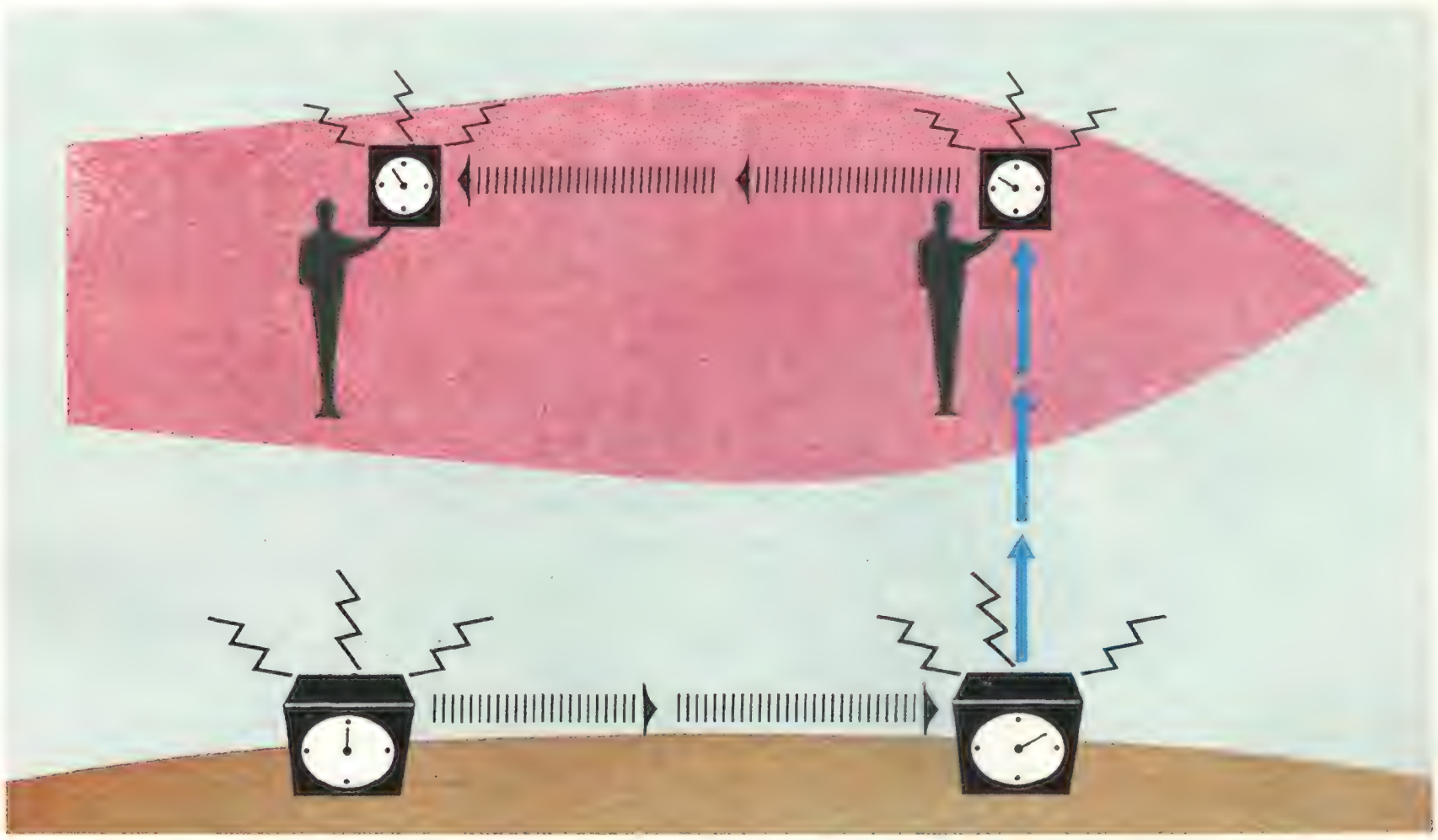
The possibilities in a situation like this are mind-boggling. What if, after seeing the second tachyon "sent," the man on the ground refuses to send the first

In a famous paradox, a twin leaves his brother behind, left, to travel around the galaxy at relativistic speeds.

He returns years later, right, to find that his brother, now stooped and paunchy, has aged faster than he has.

To an observer on the ground, a tachyon sent from the box at left above to the one at right simply gets there faster than a light beam would have. But two observers in a passing rocket see something else. The crewmen at left stops his watch when the tachyon is transmitted. The crewman at right stops his when the tachyon is received. When they compare notes, they find that the man on the right stopped his watch first.

The tachyon was "received" before it was "sent," or, more simply, it went the other way. Below, the situation becomes even mind-boggling. This time when the man in the front of the rocket sees the transmitter-receiver below him activated, he sends another tachyon to the man in back. By comparing all the clocks, they discover that the second tachyon was received before the first one was even sent.



one and perhaps even destroys his transmitter? Then the second tachyon wouldn't have been sent. But it's already been received. . . .

I can remember fantasizing about situations like this when reading science fiction as a boy. If something had been sent back 15 minutes in time, then that something would appear in the laboratory 15 minutes before the switch was pulled to send it back. For 15 minutes the object that you are going to send back in time would be sitting on the desk in front of you. Imagine what would be going through your mind during those 15 minutes. What if you didn't pull the switch? It would be like playing "chicken" with the universe.

Actually, physicists have thought quite a bit about this type of paradox involved with tachyons. I think it is fair to say that at the present time, all of the paradoxes can be resolved at the particle level, although the resolutions become stranger and stranger. For example, in the paradox described above, the man in the rocket ship actually sees the first tachyon "sent" from the ground "receiver." If the ground "transmitter" is destroyed, the men in the rocket will see that tachyon go right through the spot where the transmitter was and eventually be absorbed in a remote corner of the universe. He still sends the second tachyon, though, since the "receiver" was activated.

From the point of view of the man on the ground, the first tachyon will appear to move in the opposite direction—from a remote corner of the universe to the ground "receiver." So just after he has destroyed his "transmitter," he sees the tachyon he would have sent come zipping in from outer space, so that his receiver goes off no matter what. In terms of particles, there is no paradox: both tachyons always get sent. But what does a resolution like this do to our idea of causality and chance events?

Whether or not we find tachyons, it's fun to think about time travel. One of the great stories on the subject is "All You Zombies" by Robert Heinlein. The story concerns a girl, abandoned on the steps of an orphanage as a baby, who grows up, is seduced, has a daughter who is stolen from the hospital, and then undergoes a sex change operation. "He" makes a living writing confession stories, and one day comes into a bar and spills the whole thing to the friendly bartender. While the jukebox plays "I am my own Granpaw," the bartender recruits him into the Temporal Bureau, a sort of time-travel CIA. In the end, we realize that all the characters in the story—infant, mother, seducer, writer, and bartender—are all the same person on different stages of travels backward and forward in time. Think about *that* for a while.

So where do we stand now on the question of faster-than-light travel? We know that the existence of tachyons wouldn't violate any general principles of physics, and that an entire world of faster-than-light objects could exist side by side with our own. We have no experimental evidence that they do exist, although this isn't so surprising. Except for the fact that they travel faster than light, we have to guess what other properties they might have, which makes it difficult to think of experiments to find them.

They might not even interact with normal tardyon matter at all, or they might interact in a way that we haven't thought of yet. A good analogy to this sort of situation would be the existence of radioactive elements before the discovery of ways of detecting radioactivity. The elements were there, but no one knew it, and there was no way of detecting them. In any case, all of this is a long way from the starship *Enterprise*.

If at some time in the future someone does come up with a way to detect tachyons, and maybe even control them to the point of being able to emit signals, there would be some interesting consequences. For one thing, the question of whether or not advanced civilizations exist in the galaxy could be settled, because we could have practically instantaneous communication over interstellar distances.

At the same time, the existence of tachyons would pose some pretty sticky philosophical problems about the nature of causality. Physicists have argued that there would be other problems as well: they might not obey the same kinds of laws that govern other subatomic particles. When I think about problems like this, however, I always recall a motto of the Temporal Bureau in Heinlein's story:

A Paradox May Be Paradoctored.

Some day we may talk to the galaxy by flipping a dial (*e.g.*, the blue channel for blue transmitter, upper left).

INTER-
GALACTIC
INC.

By E. F. Rivinus

Millions of noisy guests can spoil your whole winter

Birds can be beautiful, but not when a sky-darkening flock decides to make its seasonal home right down the street

One of life's ironies, and heaven's less appealing prospects, is that too much of *anything* becomes cloying—even birds. What more welcome harbinger of spring than a newly arrived redwing blackbird perched on his chosen cattail, announcing his territorial claims? Yet this same springtime charmer, descending with several thousand of his fellows on an August cornfield or swarming noisily into a wooded suburban park at dusk of a winter evening, is an unmitigated pest.

The redwing is just one of several species of "songbird" which at certain seasons socialize in mass concentrations to our economic and social distress. The others include the rusty, Brewers and yellow-headed blackbirds, common and boat-tailed grackles, starlings, bobolinks and brown-headed cowbirds. Besides these, several gull species now congregate over our dumps in unprecedented numbers, house sparrow populations have exploded in some suburban developments, pigeon, or rock dove, populations are spreading out into new man-made habitats, and a newly liberated exotic, the monk parakeet, for a time threatened to create greater agricultural havoc than all our imports to date combined. We wistfully deplore the extermination of the passenger pigeon and the Carolina parakeet, but one wonders just how long modern American

A small portion of a pest blackbird flock returns at sunset to a winter roost near Graceham, Maryland.

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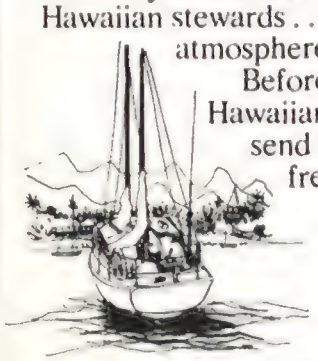

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A young redwing begs for food.

society would have been able to tolerate these highly social species.

Farmers have long struggled with "pest birds," but only with the post-World War II spread of suburbia over our countrysides have some birds become a serious nuisance to city and suburban dwellers. Suddenly, or so it seems, huge flocks of "blackbirds" have descended on peaceful communities such as Graceham, Maryland, Sterling Park, Virginia, and Paducah, Kentucky. Alarmed and harassed citizens, nursing visions of disaster ranging from Hitchcock's fanciful horror film, *The Birds*, to fears of bird-associated disease epidemics, and with their evening and early morning rest shattered by the raucous calls of thousands of birds arriving at or departing from their roosts, cry out for "something to be done about it." Urban reporters dash out to cover a "new sensation." Any rational assessment of the problem, as well as any rational effort to find out what can or should be done, gets lost in a welter of emotional voices and conflicting opinions.

The Audubon Naturalist Society of the Central Atlantic States, which has its headquarters in Chevy Chase, Maryland, has been one of the groups keenly aware of the problem. The directors wanted to develop a rational, useful and, it is hoped, model policy toward community efforts to deal with it. Therefore, during the summer of 1974, the president asked me, as an officer of the society interested in the blackbird issue, to organize a task force to develop such a policy and to act as its secretary.

In defining the problem, we found it to be many-sided. First of all, it is clearly economic. According to Fish and Wildlife Service estimates for 1971, bird damage to ripening corn came to 6.8 million bushels nationwide; in some states birds were credited with pulling up as much as two percent of the planted acreage of sprouting corn. Birds cause lesser but still significant losses to growers of rice, sorghum, soybeans and, ironically, sunflower seeds, which are grown principally for the winter bird-feeding market.

Bird depredations in the fruit-growing sector are even more impressive. In 1972, surveys revealed that 17 percent of the total Michigan cherry crop was lost to "preharvest hazards," an estimated ten percent to birds directly, and part of the remainder to bird-associated damage such as "knockdowns." Other crops which suffer importantly from bird intrusions are blueberries, grapes and peanuts. Finally, though no statistics have come to hand, cattlemen complain vociferously about the quantities of expensive feeds they claim are consumed or contaminated by raiding blackbirds in winter feedlots.

Starlings, grackles and redwings get most of the blame for agricultural damage, but they are not alone. Many "good" birds are less than welcome on the nation's farms in fruit- and grain-growing seasons, notably robins, cedar waxwings, house finches, meadowlarks, orioles, blue jays, gulls, swans, Canada geese, ducks, pheasants and, of course, crows—though with one or two exceptions, none of these invades crop areas in numbers anything like the blackbird species.

The problem is also social. The noise and the dirt created by a million blackbirds has to be experienced to be believed. Indeed, one of the Court of Appeals judges who ruled in favor of a 1974 blackbird killing proposal by the U.S. Army in Kentucky advised me that he was much influenced in his approach by the patent desperation of the community that had been living for several winter weeks close by a several-million-bird roost.

In its environmental impact statement the Army noted that the roosts which troubled them might be a source of histoplasmosis, a disease of the human respiratory tract caused by a fungus that thrives in bird droppings. Not unexpectedly, there is wide public concern that this or other bird-borne diseases might find a breeding ground in roost areas, where a

Acting director of the Smithsonian Institution Press, Rivinus is chairman of the Audubon Naturalist Society.

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A female redwing vocalizes.

season's accumulation of the nightly droppings of a million or so birds becomes formidable.

Bird concentrations around airports or in established flight paths also create serious hazards to human life. Generally speaking, this is a separate problem, and as often caused by "desirable" bird species as by blackbirds. Starlings ingested into jet engines have caused fatal crashes, but so have boobies, seagulls and whistling swans. Yet wherever huge concentrations of birds form, they do constitute a hazard to local aircraft.

Finally, some pest birds are endangering other bird species, and to a naturalist group such as ours, this too is a serious matter. Introduced starlings and house sparrows seek holes or cavities in which to build their nests. So do bluebirds, woodpeckers and other popular natives. The foreigners are more aggressive, however, and they have tended to drive out the native species and usurp their nesting holes. Nesting success of America's three species of bluebird has been reduced to near disaster levels as starlings have invaded rural districts and taken over bluebird nest sites. Common grackles relish the eggs or young of other species as a diet supplement. Grackle populations have increased in recent years, and their depredations have assumed more serious proportions.

Another "blackbird" found in most winter concentrations is the brown-headed cowbird, which often lays its eggs in the nests of other, usually smaller, birds, leaving to the hosts the task of hatching and rearing the new generation of young cowbirds. Because fledgling cowbirds are more aggressive as well as larger than their nest mates, they get the lion's share of the food brought by their foster parents, and in many cases push their weaker brethren out of the nest, so that frequently only cowbirds are fledged. The recent intrusion of cowbirds into the only known nesting area of the endangered little Kirtland's warbler in Michigan resulted in a high degree of cowbird parasitism on the warblers, and a consequent alarming drop in the Kirtland's warbler reproduction.

With the exception of starlings, all the pest blackbirds are markedly migratory, nesting far north of their wintering areas. The northbound migrations of these birds in spring are more of a steady flow than surging wave. Springtime grackle flights may on occasion be notable, but redwings and cowbirds infiltrate individually and without attracting special attention. Their southbound fall migrations are something else. Their ranks swelled by the young of the year, redwings, cowbirds and grackles begin to form large and restless flocks by late summer, and the months of September and October will see them on the move. The late ornithologist Edward Howe Forbush gives an account of a southbound grackle flight 70 years ago which sounds familiar: "A great flight of these birds passed over

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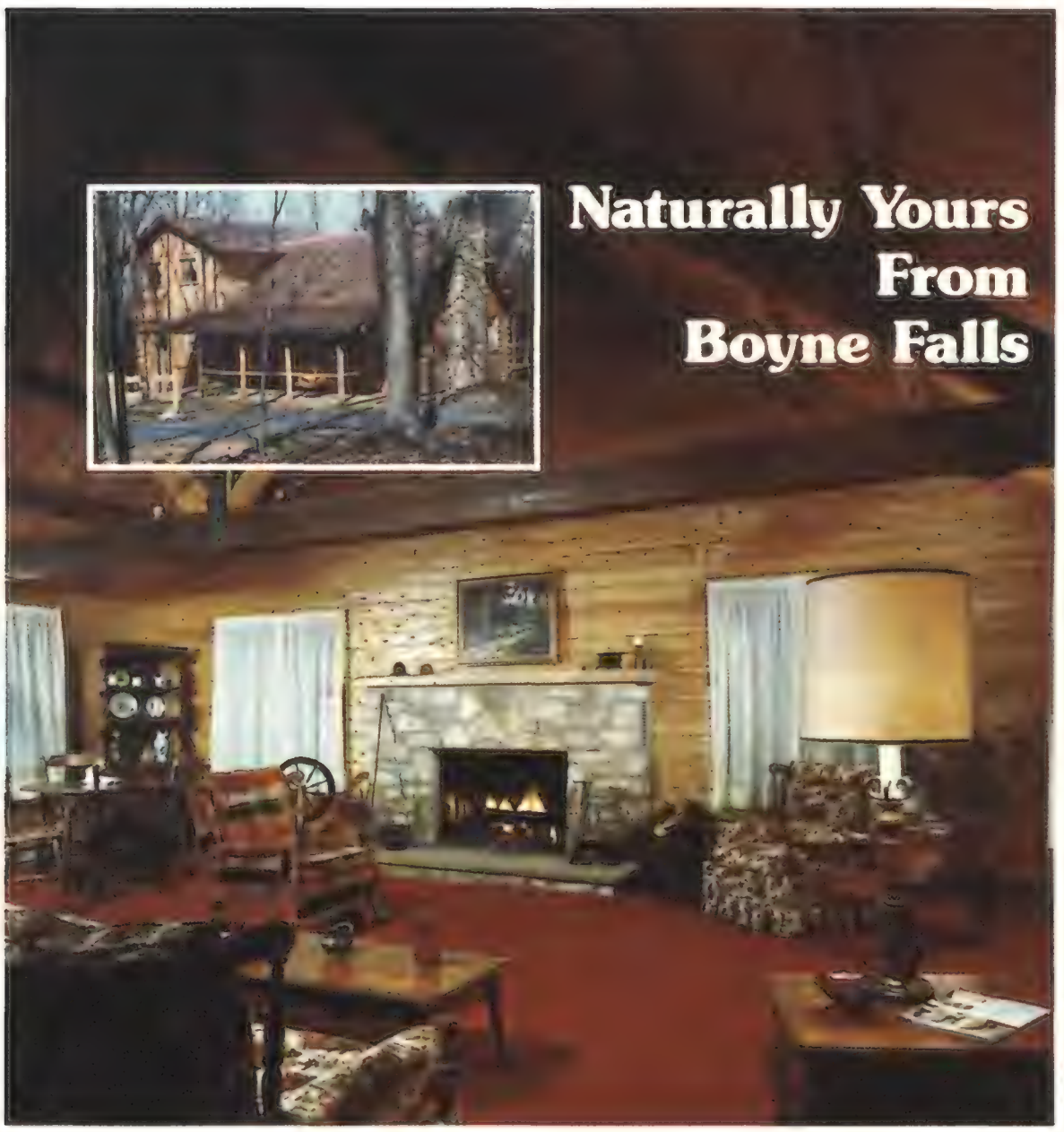
Blackbird aggregations are not new—what is new is that human communities have fanned out steadily along their routes so that today there are more people to be bothered, and fewer roost areas for the birds where they won't be pests.

Fall migrations pass through the Southern states in waves or series. Migrants headed for the rice field areas of Louisiana will pass through Kentucky and Tennessee several weeks before the arrival of the birds that winter in those areas. The early bird may not get the worm, but it is the early migrants that do most of the agricultural damage in the South, because they are the ones that arrive while corn, rice or other grains may still be in the fields. The early flocks may stay for a week or two, and may indeed be troublesome to nearby communities during their stopover, but they move on of their own accord. The more permanent winter concentrations normally settle into a roost area in December, and if not disturbed will use the roost until about mid-March, when they break up and depart almost overnight for their northern nesting areas. Blackbird flocks that arrive in an area in December will find little unharvested grain in fields, and they feed largely by gleaning the waste scattered by harvesting machinery. The point to note here is that the birds which contribute most significantly to the economic problem along the migration routes are for the most part not the ones which create social concerns in their winter roosts.

Redwing blackbirds now nest in fields.

Natural attrition affects all of these birds throughout the year, but mostly during the winter season. Weather, predators, disease and other hazards normally eliminate anywhere from 50 to 70 percent of the birds of all species from one nesting season to the next, and blackbirds are no exception. Yet, although attrition percentages remain constant, some blackbird populations have increased notably in recent years, because more young are being fledged in each nesting season. This in turn is the result of habitat changes, in which Man himself has played the most important role.

Environmental changes over the past 70 years have had major effects on the pest bird problem. To begin with, the roosts are in closer contact with many more people. Suburban sprawl, which has used up our woodland thickets, and wetland destruction, which eliminates the marshes where many of these birds would roost if they could, have so reduced ac-



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ceptable roosting sites that there are few places left where a hundred thousand or more birds can gather without disturbing some human community.

Surprisingly, too, suburban construction itself has contributed significantly to the expansion of some of these bird populations. Dr. Al Geis of the Patuxent Wildlife Research Center has made a study of local bird populations before and after the construction of Columbia, Maryland, a planned community of 50,000 people which sprang up on 14,000 acres of rolling Maryland farmland. Geis found that while the *variety* of bird species was greatly reduced in his study area, the *number of individual birds* was greater after housing construction than before. The difference was made up largely by three species—starlings, house sparrows and pigeons. The first two are cavity nesters, and they found eaves, louvers, air-conditioning vents, gaps in joints left by faulty construction, and the like, exactly suited to their requirements. The pigeons were a little slower to react, but in recent years have found building features so ideal that their populations in Columbia are rapidly catching up with the starlings and house sparrows. In fact, one elementary school was closed down for a time during the winter of 1975-76 by the Howard County Health Department because accumulations of guano in play areas from roosting and nesting pigeons had reached levels which authorities felt threatened the pupils' health.

The redwing blackbird, which 50 years ago nested by general preference in marshes, found its habitat steadily shrinking. Some redwings have always nested in

Buildings provide habitat for pigeons.

upland cover. As the wetlands diminished, others followed the example of their upland-nesting fellows, and today a sizable percentage of the redwing population nests far from its original home.

Common grackles have also benefitted from Man's tampering with the natural environment. Forbush noted that Man's aid to the grackles began many years ago. "Normally our crow blackbirds [grackles] are birds of the marsh and waterside in forested regions. As settlements and clearings took the place, in part, of the primeval forests, these birds found a new food supply in the corn crop of the settlers, and multiplied exceedingly." More recently, foresters in the Eastern United States have been replacing our mixed deciduous forests with quick-growing and commercially valuable loblolly pine groves, favorite and productive nesting places for grackles.

Having documented the problem and its major causes, our task force focused its attention on what Man has done about it over the years. Forbush relates an old New England remedy: "In colonial days crow blackbirds were known far and wide as maize thieves; bounties were paid for their heads, and in some Cape Cod towns a young man was forbidden by law to marry until he had turned into the town clerk a certain quota of blackbirds' heads." Although Forbush credits these measures with significantly reducing the grackle population, we know now that any such success was only local and was quickly compensated for in subsequent breeding seasons.

Over the past quarter-century the Fish and Wildlife Service has experimented with practically every bird-control measure the ingenuity of Man could devise. State and local groups have tried, too. Task-force member Don Messersmith participated in a ten-year Maryland effort to combat the depredations of blackbirds, particularly in Eastern Shore cornfields. Virtually every known device and chemical concoction was tested under field conditions. State officials concluded that while certain measures, principally noisemakers and sterilization agents, could have useful effects under limited or carefully controlled conditions, nothing has yet been developed which is generally effective, and most entail known or suspected environmental side effects which make them potentially more troublesome than the birds.

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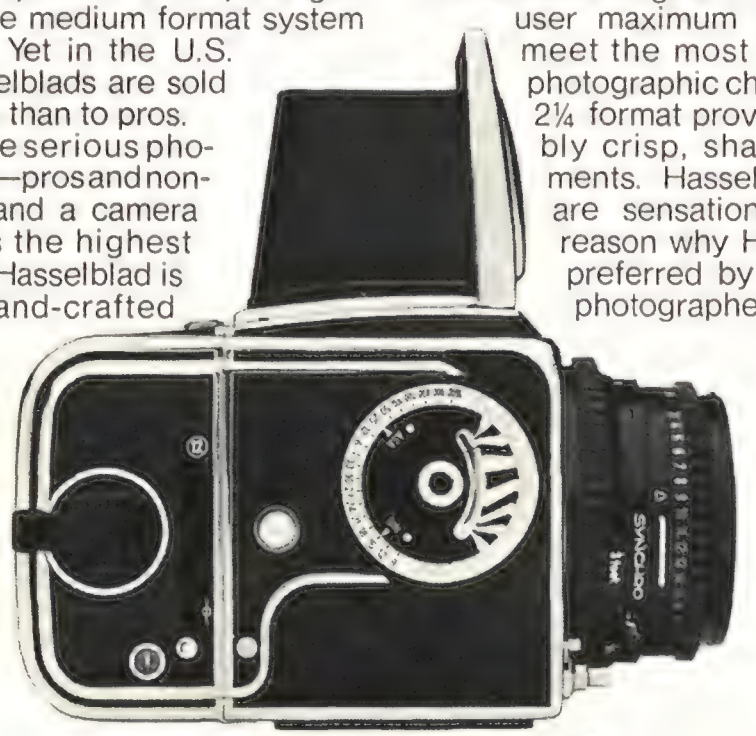

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A louver becomes a starling nest site.

Control experiments have included shooting, dynamiting, floodlights, noisemakers, chemical repellants, poisons, detergent sprays to remove the oil from the birds' feathers so that they will freeze or die of pneumonia, infection with parasites or viruses, predation, contact toxicants and sterilization agents. One farmer scattered rubber snakes in his cornfield, others tried stuffed owls and even hawk silhouettes suspended over the fields from captive balloons.

None of these methods has offered more than partial or temporary solutions. Some of them help to disperse the birds from roosting areas, but they simply move to another roost. Cannons, rubber snakes and balloon-borne hawks scared birds out of cornfields for a short time, but the birds quickly realized they were harmless, and before long they paid them no heed. Detergent sprays, like most chemical warfare devices, were affected by shifts in air currents or other climatic factors, tended to clog the nozzles of the spraying devices, and were only effective when used under proper climatic conditions. Shooting and dynamiting kill at best only a small percentage of the birds in a roost area, although they cause widespread crippling losses. Poisons and sterilization devices, besides affecting only a limited number of birds, create dangers for nontarget species up to and including Man.

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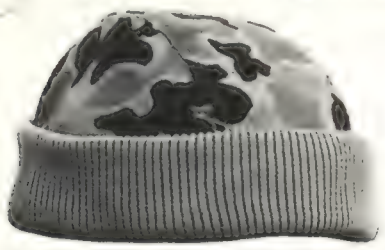

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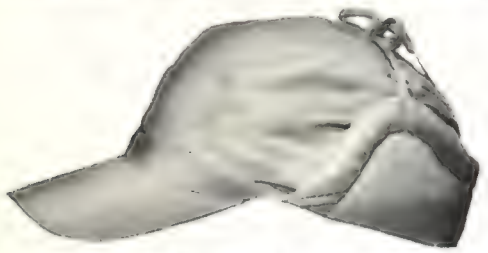

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no longer support or shelter the flock. This method was used at Graceham, Maryland, where more than a million birds congregated in the winter of 1973-74. Maryland's Department of Natural Resources thinned the pine grove in which the birds roosted by 30 to 40 percent; there was no significant blackbird concentration in or around Graceham the next winter. In a variation on this theme, Geis has found that builders can make houses and apartment buildings much less attractive to the starling-house sparrow-pigeon set. This has been done in recent construction at Columbia, and in the new sections starling and house-sparrow populations are minimal.

Acoustic devices have had considerable success in small areas; some broadcast bird distress calls, and other more complex sounds. In the words of the inventor-manufacturer of one of the latter: "It interferes with an animal's ability to hear the danger and social sounds upon which his security and sense of well-being depend. The animal becomes psychologically stressed—nervous and uncomfortable." This device has been used with considerable success in Maryland against birds in cornfields and against birds coming in to roosts. It is loud, but used properly can clear a troublesome roost area in four or five days.

In the Kentucky-Arkansas area, the Fish and Wildlife Service has found effective a combination of taped bird distress calls and firecrackers or other explosives. A couple of large roosts were vacated in four to five days when the incoming birds each evening were greeted with a concert of this music.

Dispersal is a humane way of dealing with pest-bird concentrations, but it simply moves the problem—very likely to some neighboring community. Significant reduction of blackbird populations is the only definitive solution, but it is not easy to achieve. Sterilization of eggs has been temporarily successful with birds that nest in large, accessible colonies, like gulls, and grain treated with a sterilizing agent has been fed to isolated colonies of redwing blackbirds. However, the colony has to be isolated and concentrated for sterilization measures to be effective. Generally speaking, our pest-blackbird species nest individually and along with other "desirable" species which would eat treated grain as readily as the target blackbirds.

This leaves us with the option Man has always resorted to (and usually unsuccessfully) in dealing with pests: slaughter.

Fancy brickwork may invite pest birds.

But a great many birds have to be killed to reduce concentrations of millions of birds to tolerable numbers, and the job becomes more complicated when it has to be done "humanely," eliminating only "target" species and without harming the environment. In fact, no method has yet been developed which can reliably meet all these requirements. The most promising is the one which attracted such wide public attention last year when the commander at Fort Campbell, Kentucky, together with several nearby civilian communities in western Kentucky and Tennessee, appealed to the Environmental Protection Agency for permission to liquidate several very large blackbird roosts. EPA and the courts gave their respective approvals to operations against roosts in nine locations, and five were actually undertaken. The roosts varied in size from an estimated 400,000 birds at Liberty, Kentucky, to more than three million at Greenbriar, Tennessee.

The roosts were sprayed at night from helicopters with a special detergent, PA-14, then drenched with water. The detergent reduces the surface tension of the protective oil on the birds' feathers. The oil is then washed off by water, the birds become soaked, and they will die rapidly if exposed to a sufficient chill factor.

According to Fish and Wildlife Service reports, at Greenbrier detergent and water were sprayed over the roost in near-freezing weather with a stiff wind increasing the chill factor substantially. An estimated 83 percent of the three million

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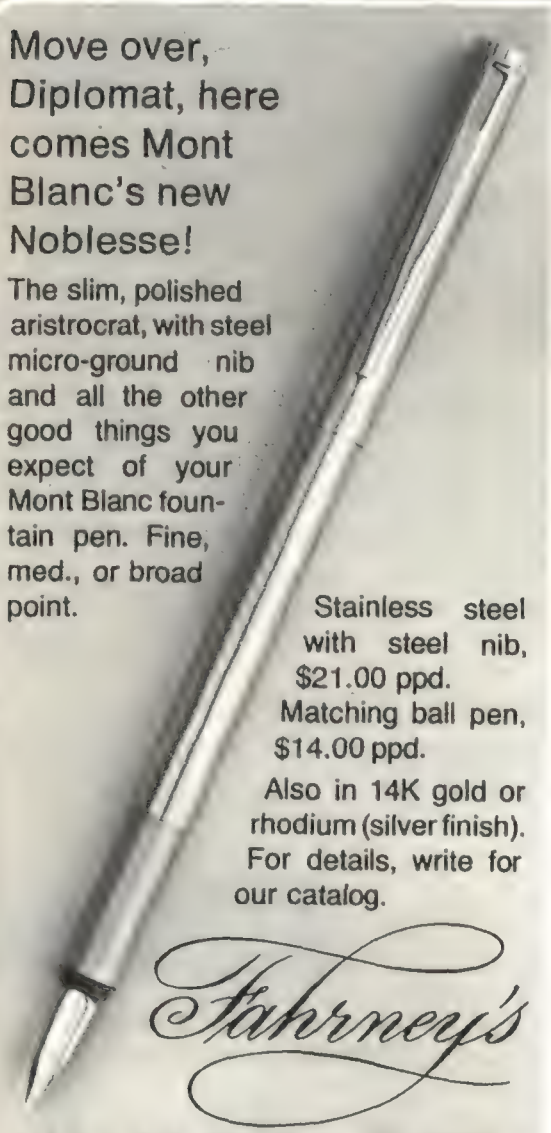

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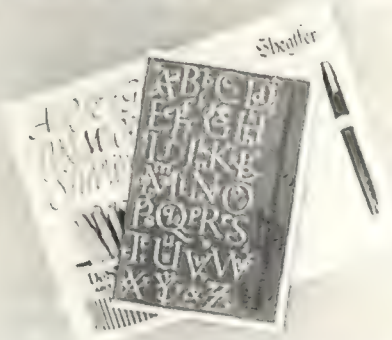

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Odor-proof biologist readies an alarm.

birds succumbed. The operation at Liberty was equally successful—a freezing rain made it unnecessary to spray with water. At least 80 percent of those 400,000 birds were eliminated. There was some comfort in reports that 60 percent of the Liberty kill and 50 percent of that at Greenbriar were starlings, and that no nontarget species were found among the dead birds.

Operations under less favorable conditions were far less productive. Only 50 percent of a million birds at Madisonville were killed, and at Paducah and Fort Campbell the rate dropped to 23 and 26 percent, respectively. The Army's kill of 520,000 birds sounds pretty impressive, but since 1,480,000 birds remained in the concentration, the alleviation may not have been readily apparent to the suffering community. And the recuperative powers of the birds was made abundantly clear when the same communities were obliged to seek permission for comparable measures the very next winter (1975-76).

While the total bird kill in western Kentucky and Tennessee came to more than four million birds, Fish and Wildlife observers estimate that upwards of 77 million blackbirds occupy 59 recorded

winter roosts in the Kentucky-Tennessee area, and a further known 54 roosts in neighboring Arkansas reportedly contain another 40 million. The national total was estimated in a 1969-70 report by Brooke Meanley of the Fish and Wildlife Service at more than 350 million "blackbirds" in 674 pin-pointed major roosts. Meanley noted that reporting was far from thorough. Achieving a one-time reduction in these numbers is difficult, and once is not enough. The job must be done year in and year out to be effective. And the recuperative abilities of any substantial blackbird breeding population render it not Herculean but Sisyphean.

One way not to approach the issue is to end-run our long-term environmental protection laws for the short-term gain of controlling a few roosts. Yet that is what happened early this year when Kentucky and Tennessee Congressmen managed to slip through Congress without hearings or even review by interested subcommittees "emergency" legislation authorizing state governors to treat roosts of 500,000 or more blackbirds without submitting the enviromental statements required by law. The only restriction on the types of chemicals to be used was that they be "registered for bird control purposes."

The bills were rushed through and signed by the President before environmentalists realized fully what was happening. Promptly, the governor of Tennessee certified that every roost in the state was hazardous and Tennessee authorities quietly "registered" for bird-control purposes an insecticide called Fenthion which has deplorable secondary effects. Hawks or owls that eat birds that

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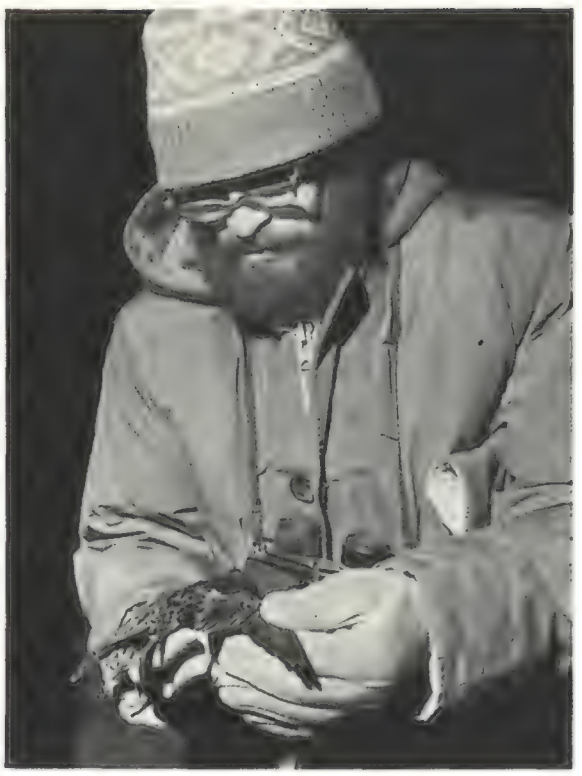

Ornithologist examines a dead starling.

have absorbed Fenthion are affected by it, too. Many species other than the offending blackbirds were reportedly killed. To forestall such hasty and ill-advised "emergency" measures, the Fish and Wildlife Service has applied for EPA authorization to undertake planned PA-14 operations to eliminate not more than 50 million blackbirds annually nationwide.

However accomplished, wholesale killing of birds raises issues to which today's public is far more sensitive than was the case when Colonial swains filled quotas of birds' heads to claim their brides. Many sincere, articulate and influential people have become seriously disturbed at the prospect of mass bird killings—no matter what the species and no matter what their sins against humanity. I enjoy hunting, but I'll confess that my gorge rises at the idea of the cold-blooded slaughter of millions of birds basically because they're noisy and dirty neighbors. Yet after one winter afternoon exposed to the sound and smell of a million-bird roost at Sterling Park, Virginia, I'm more sympathetic than I was to the concern of local residents and agree that some long-range measures should be developed.

The ornithological question remains, too. Shall Man, the great manipulator of nature, permit such pleasing species as the bluebird and the flicker to be gravely reduced in numbers, possibly even exterminated, by aggressive and arrogant birds like the starling which isn't even native to our country? Or shall the paren-

tal solicitude of the Kirtland's Warbler be exploited perhaps to the point of no return by the cowbird?

These are the kinds of hard decisions which must be dealt with by conservationists and ornithological societies. The Audubon Naturalist Society has agonized over the adoption of a policy toward pest birds and their control. We have declared our sympathy with harassed communities, and we are prepared to endorse control measures that do not cause prolonged or unnecessary suffering, and that will not affect nontarget species or the environment unfavorably. Above all, we want to get the word to state and community leaders who may face citizen pressure generated by a bird roost to call on experienced help from the nearest Fish and Wildlife Service representatives or their state counterparts, and not to resort to possibly illegal "home remedies" in a panic. Such remedies are likely to do more damage than the birds, and what really counts is that there is a high probability that they won't work. Maybe the solution will prove to be quotas of bird heads for marriage—or drivers'—licenses.

Birds come on and on despite massive spray and freezing projects as at Fort Campbell.

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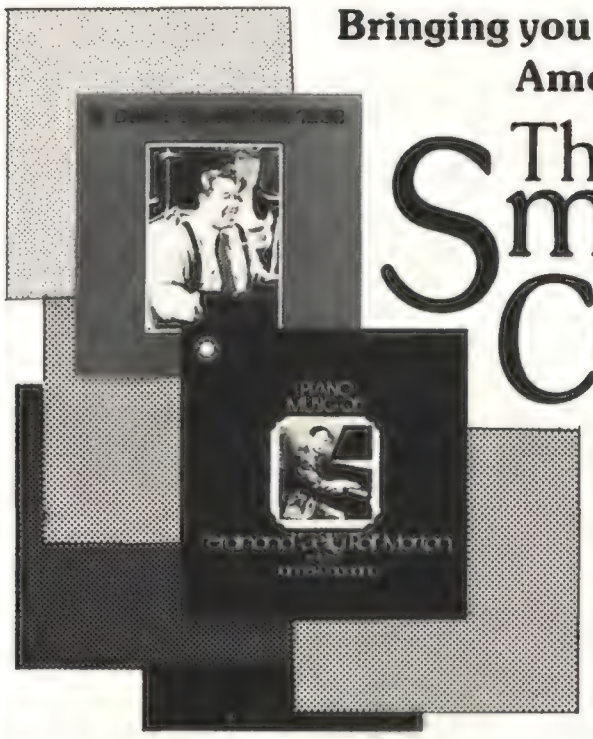

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ally became familiar with every bolt and nut of every carriage.

Since the only literature available, besides the catalogs and parts lists, was company records, this was no easy task. It was necessary, however, if my restorations and repairs were to be exact.

At one time there appear to have been more baby and doll carriages made within a 20-mile radius of our home in Westminster, Massachusetts, than in any like area in the world. The industry in this country sprang up in several centers at intervals between 1800 and the Civil War.

In Greenfield, Massachusetts, as early as 1835, J. P. Prentice built an "improved" baby carriage, now on exhibit in the museum in nearby Deerfield. It may have been one of a kind, as there is no indication that it was ever in commercial production. But for several years prior to 1850 Greenfield was identified with the making of baby carriages. It was in Greenfield, too, that J. Morris Munson, probably the first manufacturer of baby-carriage hardware, went into business.

In February 1858, the F. A. Whitney Company was formed by two cousins, both excellent craftsmen. The first year they made 75 baby carriages, two-wheeled with a long tongue and a supporting standard in front. This was later replaced by a front wheel. The first baby carriages were designed to be pulled, and even some of the long-handled "push-type" used to be drawn by dogs, goats or other animals. The Whitney company seems to have been the first manufacturer to issue a full-size catalog.

The catalog put out by Heywood Brothers in 1886 was a work of art, featuring hand-painted illustrations.

In the old days, carriage designers did not use a drawing board, but would call in their salesmen and work out the concept, incorporating their suggestions. The idea was that a salesman should have no trouble selling the carriage that he helped to design.

This dog-drawn carriage was built in Germany about 1821.

The bodies of early carriages were finished in black enamel and hand-striped with curlicue decorations. As was the case with early Fords, you could have any color you wanted so long as it was black. Later, dark reds and greens were used with an overtone of glaze. Once the striping and decorating were completely dry, and this took days, a clear varnish—actually amber colored—was brushed over the entire carriage. Slow to dry, it took on a yellow cast and darkened as it aged.

Corduroys, velours, serges and broadcloths covered stuffed cotton padding. Moss was used for stuffing cushions. Parts of carpets went on the floorboards. Hoods were made from oilcloth. It stood up quite well to the folding of the hood over a bent ash frame. Most native woods of New England—ash, pine, oak, spruce, basswood, white birch, yellow birch and maple—went into body construction.

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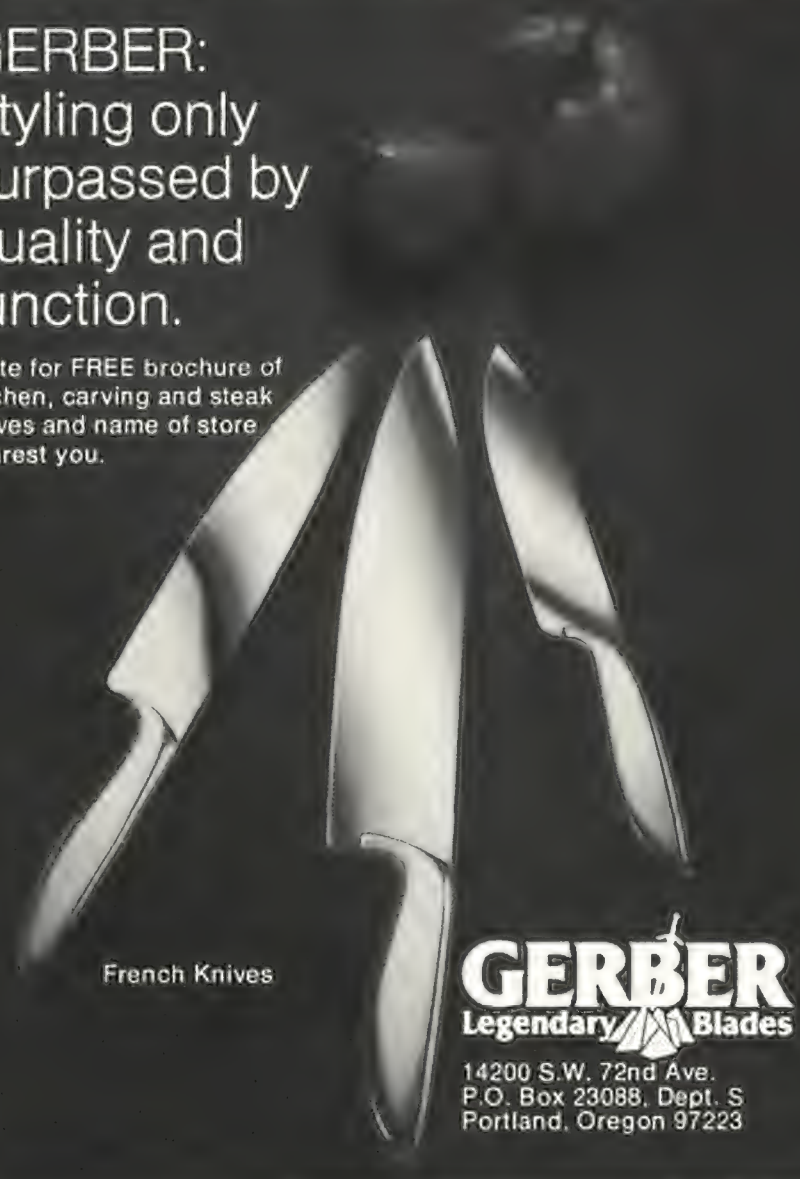

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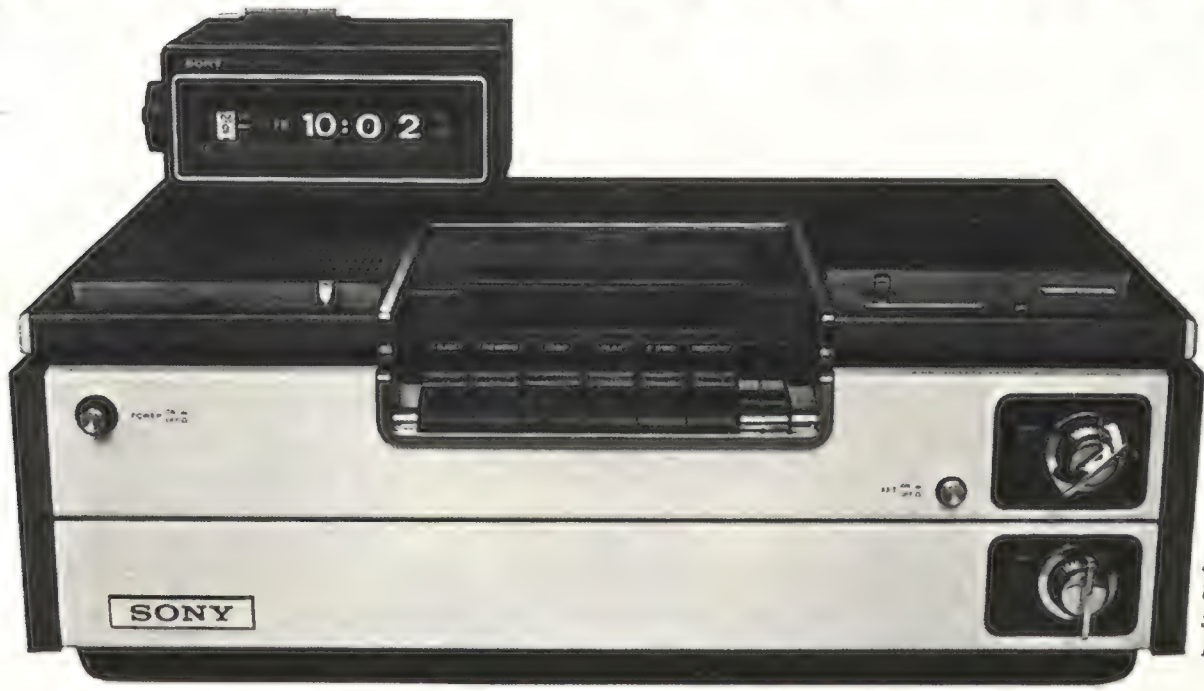

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Summery-looking reed body contrasts with wintry purpose of baby-pusher with runners.

using twisted kraft paper, sized with glue as a substitute for reed. But this construction was fragile and didn't stand up to the weather.

Many of our carriages, illustrated in these pages, have been sent all over the United States for display in furniture and department stores. Some are now at various museums across the country. We have several very early makes that were designed more or less after horse-drawn coaches. I am proudest of having Mary Pickford's baby carriage.

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William Brewster, a leader of Separatist movement, organized the migration.

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By Jan van Dorsten

Why Pilgrims left Holland

To forsake a happy, tolerant land for a wilderness inhabited by savages demanded a compelling reason

As the Pilgrim Fathers crowded into John Robinson's home in Leiden, Holland, to discuss the prospects of living in America, the weak among them quaked and trembled at the prospect. Even if they reached their destination, it would be a miracle if any of them survived. Only desperate people could have considered such a plan. But one does not, somehow,

John Robinson was Pilgrims' minister and guide during years in Holland.

think of the Pilgrim Fathers as desperate people. Then why did they do it?

Though the Leiden years had not brought them prosperity, they had proved tranquil, by 17th-century standards. Free of oppression and persecution, the Pilgrims had spent the decade since 1609 in a peaceful provincial town. Their spiritual center was Robinson's house in Bell Alley, a little cobblestone street that looks much the same today as it did then. On the corner—where a café now stands—was a bookshop owned by an Englishman, one Thomas Basson, who died shortly after the Pilgrim Fathers' arrival. His son continued to print and sell books. Behind Robinson's house stood an unused chapel that housed the University of Leiden library, fencing school and anatomy theater (SMITHSONIAN, November 1975). Sometimes the English congregation held services there, but of course Robinson and the other Separatist leader, William Brewster, kept their flock aloof.

Some years before the Pilgrims' arrival, English strolling players used to perform

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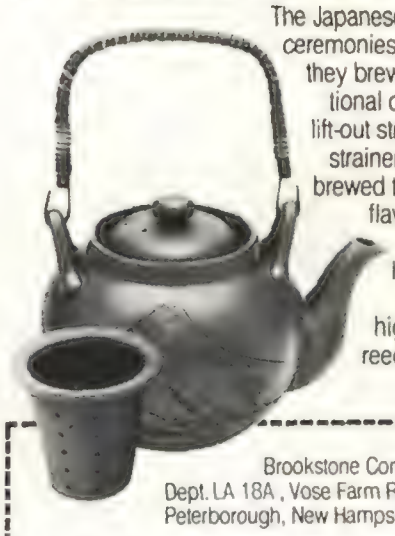

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Dutch children of 17th century play typical games that the Pilgrims' children

plays in the courtyard outside the chapel —until some of the resident professors objected to the noise. The Pilgrims found the surroundings serene, part academic, part English, a place where they could live simple lives like other working-class refugees. Nothing indicated that they were about to make history.

The prospect of giving this up to live in America was terrifying. They all knew that the Indians were, as their chronicler, William Bradford, put it, "cruel, barbarous, and most treacherous, most furious in their rage, and merciless where they overcome." Worse still, as well-informed people helpfully reminded Robinson's flock, these Indians "are not content only to kill, but delight to torment men in the most bloody manner" such as "flaying alive with shells" or "cutting off the members and joints" one by one and broiling and eating them in front of their victims. The Leiden Pilgrims were horrified. These tales made "the very bowels of men to grate within them."

It seems strange that they did not drop the idea then and there. But instead, some left Holland in 1620 and set out on their historic voyage. Why did they?

The answer generally given is that they left the Netherlands not only because jobs were difficult to find, but because their children were beginning to act and look like Dutch children, and to rebel against parental authority and principles.

Author heads English department at University of Leiden and is a Fellow at the Folger Shakespeare Library.

learned—along with other cultural influences that rubbed off on them.

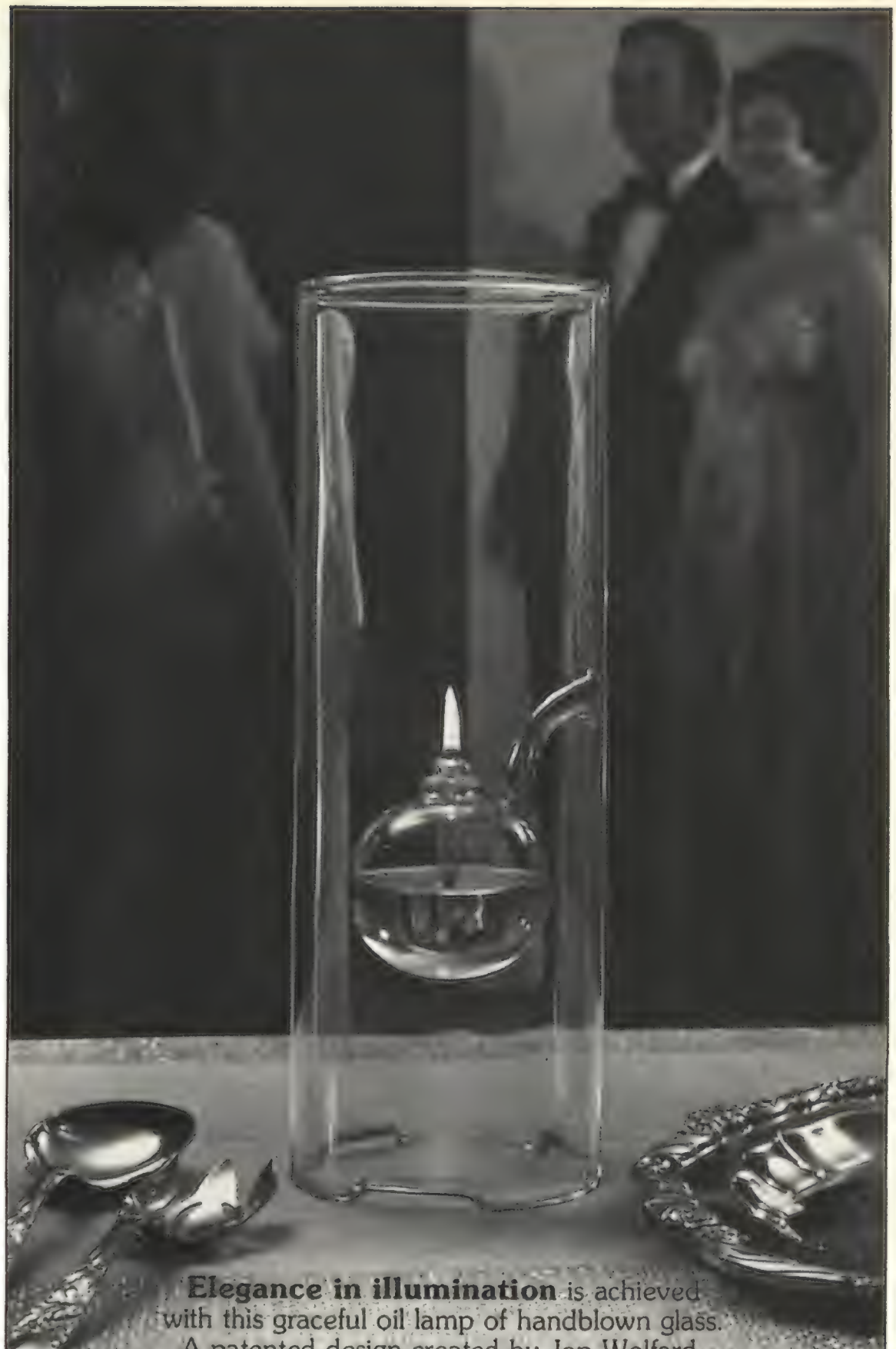
A Dutch historian necessarily feels a little hurt by this. He finds it difficult to believe that anyone would deliberately expose wife and children to being maimed and broiled ("piecemeal") by merciless Indians simply because the children were becoming so Dutch.

John Robinson's congregation of Separatists had only one desire: to be left alone. That was why they left their country for Holland. They knew that the Dutch Republic was "a dear [costly] place." But since "they valued peace and spiritual comfort above any other riches," they accepted the expense because they knew that Holland was the most tolerant part of Europe.

Their obvious first choice was Amsterdam, a rapidly expanding center of commerce where jobs seemed easy to find. Unfortunately, they became involved almost at once in another round of religious quarreling with their fellow-countrymen, the Puritan congregations.

Within months they moved on, to the expanding Dutch city of Leiden, "made more famous by the university wherewith it is adorned." In that year, 1609, Leiden was the most actively tolerant city of Europe, harboring thousands of Protestant refugees and also offering hospitality to Catholics and dissenting minorities.

By the middle of the 17th century, Leiden was to become the second largest city in Holland, and even during John Robinson's time its size doubled. No doubt the liberal religious and political policies of its magistrates were partly responsible for this sensational expansion. During the



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Pilgrims pray before embarking from Delftshaven, Holland, aboard *Speedwell*.

long months of 1573-74, Leiden was besieged by the Spanish. But, unlike most other towns, Leiden had not surrendered; and, in retrospect, this could be said to mark the beginning of a new era of spiritual and intellectual independence.

To emphasize the Dutch rebels' determination, a university was founded some few months after William of Orange had flooded the countryside to allow a fleet of Dutch sailors— "Sea Beggars"—to rescue the starving citizens, bringing them salt herring and white bread, a wholesome combination still annually consumed there every October 3 to commemorate the day of deliverance. On February 8, 1575, four months after the siege was broken, an allegorical procession walked through the streets of Leiden to celebrate the official opening of the first university of the "free" northern Netherlands. The founders thought in terms of an intellectual experiment, and history has proved them right. But as a religio-political experiment, the young seat of learning was equally unorthodox.

The Revolt of the Netherlands, and the earlier phase of the ensuing Eighty Years' War (1568-1648), was a civil war as much as it was a revolt against the region's lawful ruler, King Philip II of Spain. It began as a complex mixture of political, religious and social quarrels, and no one had ever intended to create a new sovereign state—least of all a republic. Even in 1575 the Dutch rebels themselves did not know what their constitutional future (or any other future, for that matter) was

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Amaretto di Saronno.

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At Plymouth, England, they reembarked on *Mayflower* and sailed for America.

going to be if they should be victorious.

But to some of them this much was clear: the professions and the revolutionary administration would require a new generation of well-trained men brought up in the values of an emerging new society. Therefore, William the Silent and his advisers did what every young nation does today: they founded their own university. Much was going to depend on how one would interpret the University motto, *Praesidium Libertatis*. How much "freedom," and what kind? And in this special case, how much freedom of conscience was there to be?

In the next few years a new state was born, the Dutch Republic of the United Provinces. An important role was played by its first university in shaping a national ethos. The University of Leiden was a Protestant institution; throughout its early decades a debate continued as to whether it should be strictly Calvinist or governed by secular powers concerned chiefly with the advancement of learning. A conciliatory policy was carefully maintained at the time John Robinson came.

The Pilgrim Fathers wrote a letter requesting admission into the city of Leiden for "100 persons or thereabouts, men and women." Their petition was phrased with expert diplomacy as if to anticipate future events. They knew that their king and his representatives did not relish foreign hospitality to dissenting Anglicans. Someone therefore may have sounded out the people in the town hall on how to formulate this type of request, and

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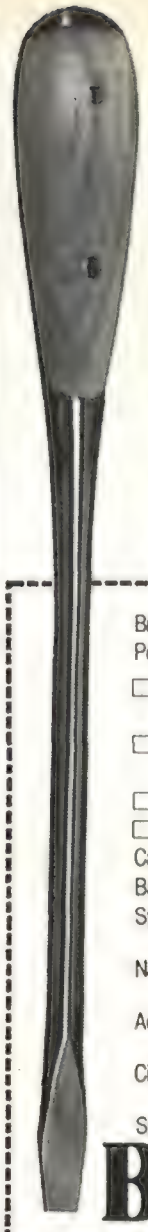

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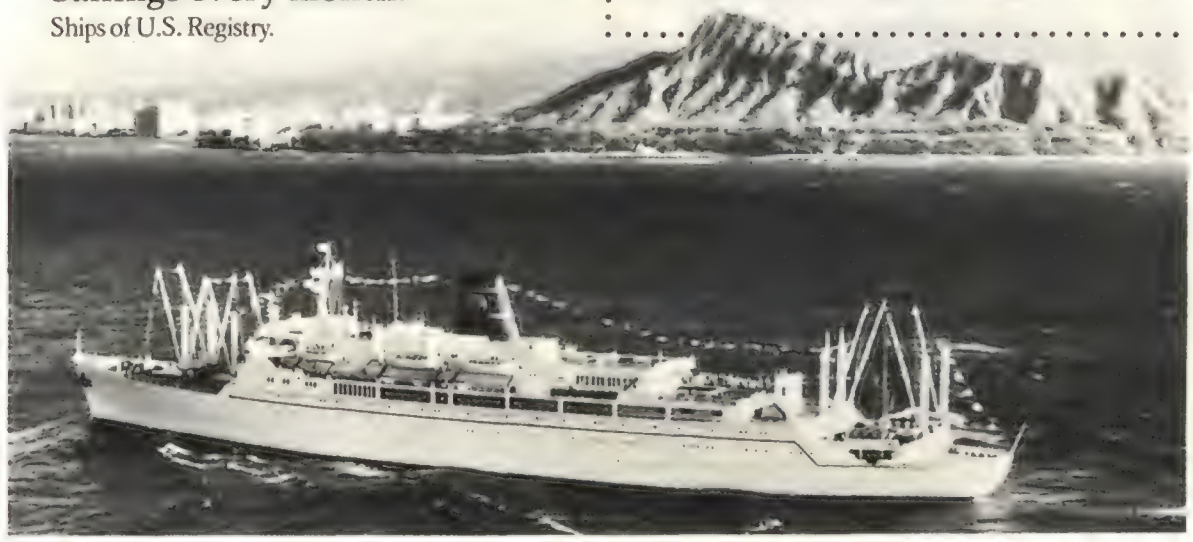

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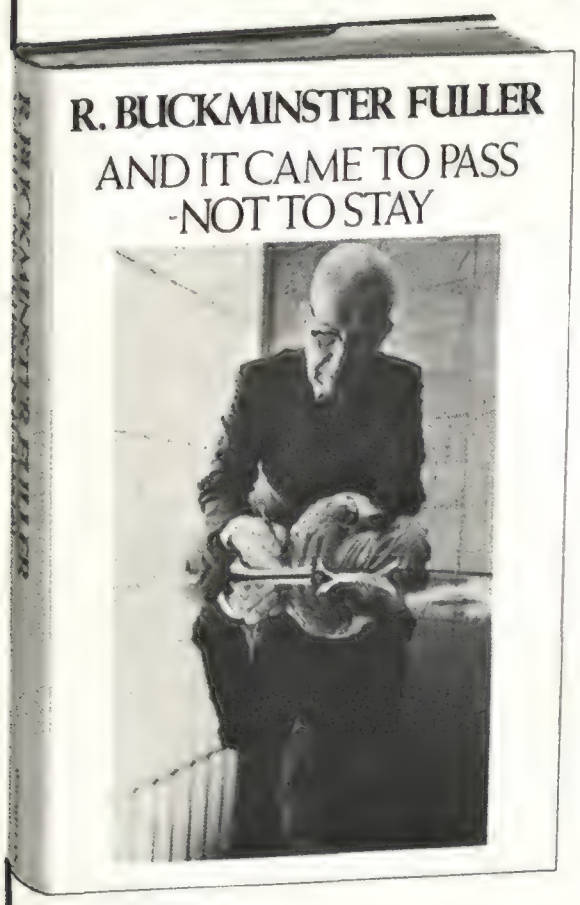

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it is perfectly possible that one and the same official drafted the Robinson letter and wrote the reply, in which the city declared that it never refused "honest persons free ingress to come and have their residence in this City, provided such persons behave themselves and submit to the laws and ordinances. And therefore, the coming of the petitioners will be agreeable and welcome."

The British ambassador objected at once, but the town magistrates were firm. Like good civil servants they coolly sent copies of both letters and asked how they could have known "that the petitioners should have been exiled from England or that they belong to a [persecuted] sect?"

The Pilgrims learned trades, stayed together, prayed together, enjoyed friendly relations with the town, the university and even with the English Puritan congregation. They kept to themselves, but they clearly knew what was going on outside. No one has yet considered whether the English bookshop on the corner was one of their links with the worlds of politics and religious dispute.

The realities of Pilgrim life in Leiden may not have been idyllic, but there is nothing quite dramatic enough in the story to explain why the Robinson group should suddenly sail to the hostile shores of America. The cause must lie elsewhere.

The Pilgrim Fathers' Leiden years coincide almost exactly with the truce of 12 years that interrupted the Eighty Years' War of the Dutch against the Span-

John Robinson's house once sto

ish. They came when peace was certain, and began to leave when the wars returned. More important, they came when religious toleration was at its height, and departed when a new, intolerant regime took over—even at Leiden.

When the war with Spain came to a standstill in 1609, religio-political quarrels of long standing began to divide Holland. Ironically, much of the ammunition had been prepared at Leiden where the liberal Professor Jacobus Arminius and his opponents had held their theological disputations. Academic debates about the relationship between Church and State were put to political uses. Warring ideologies led to a political crisis. When the inevitable coup d'état came in 1618, all Leiden-oriented liberal "Arminians" were eliminated from the political scene. A few months later Holland's leading statesman, the tolerant Oldenbarnevelt, was executed, and life took an ominous turn.

The Pilgrim Fathers were eye-witnesses to these events. The new, oppressive regime could only remind them of the reasons why they had left England. As the end of the 12 years' truce approached, they realized how "great miseries might possibly befall them in this place." The dreadful prospect of settling among the American savages became less dreadful every day.

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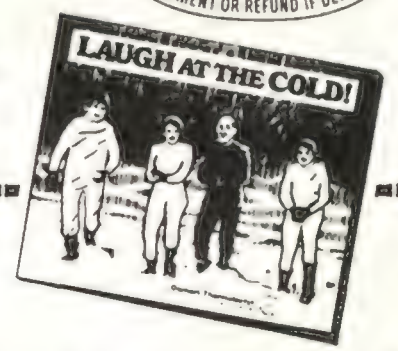

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Book reviews

The Illustrator and the Book in England from 1790 to 1914
Gordon N. Ray
(Oxford University Press, $59.95;
The Pierpont Morgan Library,
paperback, $22.50)

Earlier this year the Pierpont Morgan Library in New York presented an exhibition on the English illustrated book from the time of the French Revolution to the beginning of the First World War. Most of the material, which included original drawings, came from the collection of Dr. Gordon N. Ray, who made the selection and wrote the very large and informative catalog—book, actually—which accompanies the exhibition.

For many the riches of this period will come as a revelation, adding a new dimen-

Edmund J. Sullivan's ideal versions

sion to our understanding of 19th-century art by concentrating on a much-neglected subject. This beautifully produced catalog, with excellent reproductions, should introduce readers to the many delights of English illustrated books.

The whole range of illustrators is passed in review, from Blake, Rowlandson and Cruikshank to Kate Greenaway, Caldecott, Rackham, Beardsley. Many of the leading figures in British painting did not disdain to provide drawings for books: Turner, Constable, Rossetti, Millais and Burne-Jones, to name the most familiar. However, there are others who, while often highly competent artists, reached a much wider field through their graphic art—men such as John Martin, Daniel Maclise, Birket Foster, George du Maurier and William Nicholson.

Book illustration involves at least three separate interests. There is the author, the artist who provides the designs, and the artist who executes them. Sometimes the same person combines two or more roles, but generally, where there are three individuals, each will bring a special contribution to the final result. The text must be of sufficient quality to fire the imagination of the illustrator, who relies on the technical artist to reproduce his design.

Not surprisingly, the great names in English literature of this period were illustrated. Dickens, Trollope and Thackeray were particularly suited to such treatment—indeed, Thackeray himself provided drawings for *Vanity Fair*—and it cannot be accidental that this was, as well,

of Sancho Panza and Don Quixote

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the great age of the English novel. We should also remind ourselves that books were often read aloud to the whole family, and images of the main characters and incidents greatly helped the imagination of the listeners. How much poorer we would be without the illustrations of "Phiz" (Hablot K. Browne) to *The Pickwick Papers,* Cruikshank to *Oliver Twist* and Leech to *A Christmas Carol,* all of which have become as classic as the text. And Tenniel's drawings for Lewis Carroll are so much a part of the *Alice* books that any other version, Walt Disney notwithstanding, is unthinkable.

Some of the illustrations will be familiar through childhood memories. Indeed one of the most conspicuous new types to attract illustrators was the children's book, thus beginning a genre which flourishes luxuriantly today. The whole realm of fantasy, fairy tales, horror and ghost stories was especially fertile ground for the artist's imagination, when the design often took on a calligraphic and almost surrealistic life of its own.

On the more strictly factual level, a microcosm of English social life passes before our eyes through the medium of these illustrations. Books on scenery and topography, at home and abroad, appealed to the lover of picturesque landscapes and the tourist eager to recapture the romantic associations of his travels. Ancient architecture contrasts with exciting new railway construction. The squalor of industrial and urban England, revealed in Doré's *London,* seems to be in another world from the rural sports and activities of traditional England and the idyllic landscapes of Samuel Palmer.

At a time when the collector of modest means finds it increasingly difficult to meet rising prices, it is encouraging to know that some of these beautiful books can be acquired without losing an arm and a leg. The assiduous browser will still be able, with luck, to add to his collection examples of the finest illustrations in the history of graphic art.

—Ross Watson
Curator, National Gallery of Art

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engineers, have produced a scientific treatment of bicyclists and bicycles, "the simplest, quietest, most efficient, and least lethal [but see p. 16 in the October SMITHSONIAN] of all modern vehicles."

The book's subtitle, "Ergonomics and Mechanics," reveals the true nature of the work: ergonomics deals with biotechnology, or the human body as a machine; mechanics, in this case, deals with the physics of the bicycle. In *Bicycling Science,* the authors examine bicycle and rider as the two major components of an efficient machine interface, in the trade jargon.

Obviously, the book is written for technically inquisitive bicyclists with a penchant for mathematics. It is filled with equations, graphs and charts illustrating everything from bicycle physics to how cyclists keep cool. One of the book's major aims, claim the authors, is to help avoid potential future design errors (by whom I am not sure). As they explain, there are some physical principles associated with bicycle motion which are unalterable, such as the power capable of being produced by humans and the physical laws governing the forces imposed upon man and machine by the wind and road. These principles and laws are not known to most designers, and without that knowledge the same mistakes will be perpetuated.

The book begins with an examination of the energy requirements for transportation. There is an amusing chart in the first chapter which illustrates the propulsion power required for several animals and a variety of vehicles, including a pneumatic-tired car, a horse, leaping rabbits and a snake sliding (sic) uphill. The authors continue by studying the power producible by humans in a variety of ways, such as walking, bicycling and roller skating. They then look at the forces opposing motion, including braking, followed by a discussion of steering and balance. They finish the book by describing some of the more recent and innovative applications of pedal power, among them a water cycle (a pedal-powered boat), a pedal-driven lawn mower and a pedal-powered aircraft. As Whitt and Wilson observe, the bicycle has by no means reached the end of its evolution, and the potential applications of pedal power are limited only by the extent of Man's imagination.

Bicycling Science is a highly technical treatment of a commonplace device, but

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it is a treatment of singular interest to the bicyclist with a scientific bent. Nowhere in its pages is to be found the exhilaration of riding a shade-dappled pathway on a lazy summer afternoon, or the grueling challenge of a long-distance bicycle race. But, as the authors explain, the scientific principles underlying both activities are the same.

So, if you are one of those technically inquisitive cycling buffs, I highly recommend *Bicycling Science.* One-to-one relationships are the most difficult to handle, I am told. Whitt and Wilson may help to improve yours with your bicycle.

—*Richard R. Harlow*
Free-lance science writer

Jules Verne
Jean Jules-Verne
(Taplinger: $10.95)

Jean Jules-Verne's biography of his grandfather is almost as fascinating as the novels that made the elder Verne famous. The book gives insights into the life of Verne that previous biographers, lacking access to family secrets, have been unable to provide. Verne was so far ahead of his time that one is tempted to think he was really a 20th-century man who traveled backwards through a "time warp."

Verne studied law, with every intention of one day taking over the family practice. While he was in law school his need for diversion (from studying and from two failed love affairs) found him turning his attention more and more to writing. His early attempts were never popular. Around 1850 Verne made his break with the law and began writing seriously, much to the dismay of his father.

His first important book, *Five Weeks in a Balloon,* was published in 1863 and marked the birth of a new type: it was the first science-fiction novel.

Verne went to great lengths to research his work. He would talk with travelers, explorers, seamen, scientists of all types —astronomers, geologists, physicists and mathematicians—gathering information that would one day be transformed into novels. He loved to travel, and his many trips were the basis for much of his work. So accurate was his research that the similarities of the moon flight in *From the Earth to the Moon* (1865) and the Apollo 9 flight (1969) are astounding: the spaceships were the same height and weight, launched from the same site, and splash-

down sites were only two-and-a-half miles apart! In a novel published in 1889 he foresaw the invention of television, electronic calculators and picture telephones.

He was a compassionate man with a deep concern for the future of mankind. An advocate of technological progress, he simultaneously feared its eventual misuse and the destruction of civilization. Knowing the tendency of men to abuse power and knowledge, he used his novels as "guides"—showing the benefits of proper use of knowledge and the consequences of its abuse. Thus he was a philosopher of sorts, emphasizing the need for greater wisdom if mankind was to survive.

Verne wrote several plays, some travel novels, and made attempts at the romantic novel. None of these works is remembered. It is for his pioneering of science fiction—his rich imagination, his flare for storytelling and his determination to be accurate and believable—that he is read and remembered. Through one of his characters, Kaw-Djer *(The Survivors of the Jonathan),* Verne leaves the best description of himself: ". . . We pass briefly here; yet our steps leave their imprints on the sand for all eternity. . . ."

—Cherryl Holt
The New Republic

A Guide to the Birds of Panama
Robert S. Ridgely
(Princeton University Press, $15)

In my childhood there was only one field identification book on birds south of the Rio Grande River. Long out of print, it was a guide to the birds of the Panama Canal Zone by Bertha B. Sturgis. The volume was perhaps more bewildering to the layman for what it left out than for what it contained. For indeed the New World tropics are so rich in the number of species of birds, with new ones still being discovered in places like Ecuador and Peru, that a whole series of books, perhaps nearly one to a country, is needed to be truly comprehensive.

In the last 15 years, bird guides on the Roger Tory Peterson model have commenced appearing about such formerly exotic places as the Galápagos Islands and the Seychelles archipelago, so advanced have bird trippers become, with Lindblad cruises, Audubon field tours and similar organized trips carrying life-list makers to almost every part of the globe.

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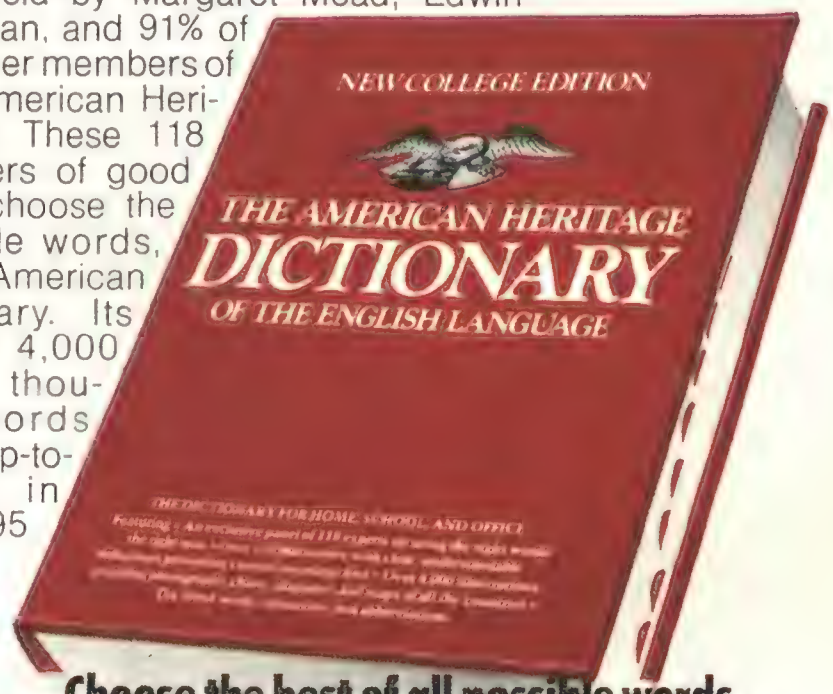

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birds of the neotropics, we now have Robert Ridgely's definitive work, sponsored by the International Council for Bird Preservation. His task has been a formidable one. Nearly 900 species of birds have been recorded from the Republic of Panama, which in size is just slightly smaller than South Carolina. Thus there are almost 100 more species to be accounted for than occur in the continental United States and Canada combined. Furthermore, bird watchers today are more demanding than they were 20 or 30 years ago. In a Peterson or an Audubon field guide the illustration of the bird, as well as a summarized identification, the voice, and a simplified habitat such as "lakes and streams," or "hedgerows" or "bushes and rocky hillside," often sufficed. Nowadays the experienced reader wants to know far more—from a fairly detailed description of the family and *its* habits and occurrence, to each species' description, the related species with which it might be confused, the specific status and distribution (so that a sighting somewhere else might provide a new record), as well as habits and generalized range. All of this is given in considerable detail, making this volume a most useful working book for the serious bird watcher.

Here, for example, is a typically full account of the Blue-crowned Motmot's habits (after a description of what motmots *are* and a reference to Plate 10): "Unlike other Panama motmots, not a true forest bird, and especially in the west often found in thickets and hedgerows in pastures. Usually seen in pairs, resting quietly in the lower growth and not very conspicuous, often passed by unnoticed. Dustbathes regularly, and at dusk quite often seen sitting on little-traveled dirt roads. Canal Zone birds give a rather dovelike single *hoo-oo* (sometimes doubled), somewhat hoarser or more tremulous than the usually tripled hoot of the Rufous Motmot; also has a very tremulous *hoorr* or *hrrroo*, softer than the corresponding call of Rufous Motmot. Chiriquí birds seem to have a somewhat different vocalization, a *woo* or *woop* repeated 2 to 6 or more times."

This is highly detailed compared to the temperate-zone bird guides. And of course it should be, not only for the zealous contemporary bird watcher, but in order to record something of the bewildering variety of species and habitats in the tropics. The plates by John A. Gwynne jr.

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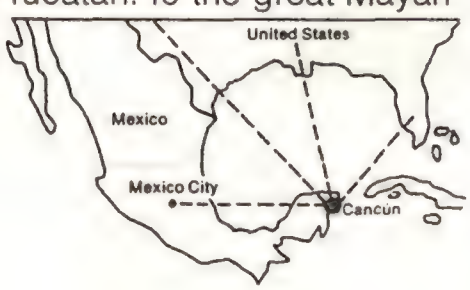

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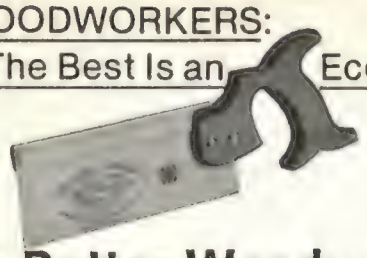

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are clear and useful; even difficult colors like glossy iridescent purples are well rendered in the reproductions. Several short summary introductory chapters precede the text, including a foreword by Alexander Wetmore, the doyen of Panama ornithologists. The chapter on conservation is a poignant reminder of the rapid pace of development in Central America, with a galloping population rate and ever-declining forests.

This is a valuable volume that serious bird watchers concerned with neotropical birds can hardly do without.
—S. Dillon Ripley
Author, *A Paddling of Ducks, A Synopsis of the Birds of India . . . , Handbook of the Birds of India . . . ,* (with Sálim Ali)

Wills of the U.S. Presidents
Herbert R. Collins and David B. Weaver
(Communication Channels, Inc., $19.95)

It is hard to reckon the invention of the cane as an important moment in history. Man may very well be a toolmaker, as Carlyle suggested, but the occasions on which he has been lame have simply been too few. As a result, gewgaws like the wheel, the lever and the electric toothbrush keep turning the heads of historians and anthropologists.

This book will go a long way toward drawing the cane out of its unsought and undeserved obscurity. Actually, the authors—Herbert R. Collins, Associate Curator, Division of Political History, Smithsonian Institution, and David B. Weaver, Professor of Law, George Washington University—have simply printed the wills of 31 deceased Presidents (four Presidents died without a will: Lincoln, Andrew Johnson, Grant and Garfield). After each will, the authors present a short treatise on its format and provisions.

Whatever else it may turn out to be, this book is right now an important document in the liberation of the walking stick. An analysis of the wills yields this fact: the cane is bequeathed more often than any other object.

True, the objects mentioned in Presidential testaments are legion, and cover such items as gristmills (James Madison), shaving tables (George Washington), swords (Andrew Jackson), shotguns (Benjamin Harrison) and slaves (don't ask).

But, in spite of all this variety, canes receive the most consistent and prolonged mention. George Washington left to his

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brother Charles the goldheaded cane that Benjamin Franklin had left to him in 1790. James Madison left two canes, one of them a "walking staff made from the timber of the frigate, *U.S.S. Constitution,* and presented me by Commodore Elliot, her present Commander." Madison's other cane had been left to him by Thomas Jefferson. For his part in walking-stick history, Jefferson completed his short will without mentioning a cane, but recovered himself in time with a codicil: "to my friend James Madison of Montpellier my gold-mounted walking staff of animal horn, as a token of the cordial and affectionate friendship."

John Adams shows himself to be outside the mainstream of American politics by mentioning no cane in his will. To compensate, his son John Quincy bequeathed four: an ivory cane with an "inscription in honour of the repeal of the House of Representatives prohibiting the reception of petitions on the subject of Slavery, 3d December 1844"; a goldheaded cane "cut from the timbers of the frigate *Constitution*" . . . engraved with the names of the "members of the House of Representatives of Massachusetts"; another *Constitution* cane (a ship that must have been fairly depleted from all the whittling) given by Commodore Hull in 1836; and a cane made from an olive tree on Mount Olivet in Jerusalem.

By the time of Andrew Jackson, this kind of lengthy enumeration has become clearly too tedious. With military crispness, Jackson simply says: "*Lastly*, I leave to my beloved son all my walking canes."

The twilight of the walking stick occurs in the will of Benjamin Harrison, the grandson of William Henry. Among other things—like his cuff "buttons" and shirt studs—Harrison bequeathes his "grand Army cane that I have used so long . . . and *all* other canes belonging to me."

Neither the word *cane* nor *walking stick* appears in Presidential wills after Benjamin Harrison's testament. However, this does not imply that Presidents stopped collecting. It is said that the Centennial celebrations of 1876 so inflamed Rutherford B. Hayes that he obsessively began to gather up anything and everything he had been associated with, including a section of the plank from the platform he stood on when he took the oath of office.

—*Michael Olmert*
Writer and critic

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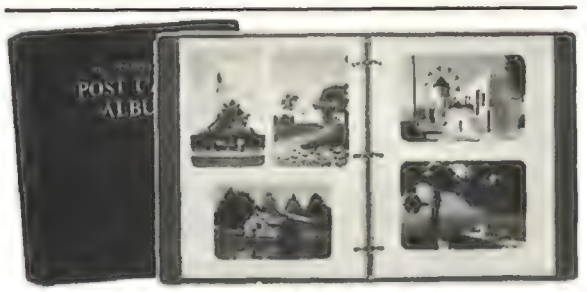

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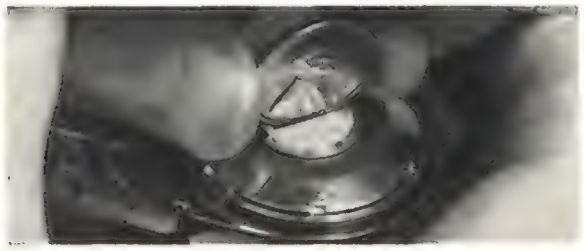

Replace the battery yourself by just opening the battery compartment with a penny. Free batteries are provided whenever you need them during the five-year warranty.

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Solid-state watches pose their own problems. They're fragile, they must be pampered, and they require frequent service. Not the Laser 220. Here are just five common solid-state watch problems you can forget about with this advanced space-age timepiece:

1. Forget about batteries The Laser 220 is powered by a single EverReady battery that will actually last years without replacement—even if you keep the 220 in complete darkness. In fact, JS&A will supply you with the few batteries you need, free of charge, during the next five years. To change the battery, you simply unscrew the battery compartment at the back with a penny and replace the battery yourself.

2. Forget about water Take a shower or go swimming. The Laser 220 is so water-resistant that it withstands depths of up to 100 feet.

3. Forget about shocks A three-foot drop onto a solid hardwood floor or a sudden jar. Sensor's solid case construction, dual-strata crystal, and cushioned quartz timing circuit make it one of the most rugged solid-state quartz watches ever produced.

4. Forget about service The Laser 220 has an unprecedented five-year parts and labor warranty. Each watch goes through weeks of aging, testing and quality control before assembly and final inspection. Service should never be required. Even the laser-sealed light source should last more than 25 years with normal use. But if it should require service anytime during the five year warranty period, we will pick up your Sensor, at your door, and send you a loaner watch while yours is repaired—all at our expense.

5. Forget about changing technology The Sensor Laser 220 is so far ahead of every other watch in durability and technology that the watch you buy today, will still be years ahead of all others.

THE ULTIMATE ACHIEVEMENT

Other manufacturers have devised unique ways to produce a watch you can read at a glance. The new $300 LED Pulsar requires a snap of the wrist to turn on the display, but the Pulsar cannot be read in sunlight. The new $400 Longine's Gemini combines both an LED and liquid crystal display. (Press a button at night for the LED display, and view it easily in sunlight with the liquid crystal display.) But you must still press a button to read the time. All these applications of existing technology still fail to produce the ultimate digital watch: one you can read under all light conditions without using two hands. Until the introduction of the Sensor.

PLENTY OF ADVANCED FUNCTIONS

Sensor's five time functions give you everything you really need in a solid-state watch. Your watch displays the hours and minutes constantly, with no button to press. But depress the function button and the month and the date appear. Depress the button again and the seconds appear. To quickly set the time, insert a ball-point pen into the recessed time-control switch on the side. It's just that easy.

Sensor's accuracy is unparalleled. All solid-state digitals use a quartz crystal. So does the Sensor. But crystals change frequency from aging and shock. And to reset them, the watch case must be opened and an airtight seal broken which may affect the performance. In the Sensor, the crystal is first aged before it is installed, and secondly, it is actually cushioned in the case to absorb tremendous shock. The quartz crystal can also be adjusted through the battery compartment without opening the case. In short, your watch should be accurate to within 5 seconds per month and maintain that accuracy for years without adjustment and without ever opening the watch case.

The new exclusive laser-sealed tritium and phosphor light source is a thin solid-state tube that automatically illuminates the display when the lights dim.

STANDING BEHIND A PRODUCT

JS&A is America's largest single source of digital watches and other space-age products. We have selected the Sensor Laser 220 as the most advanced American-made, solid-state timepiece ever produced. And we put our company and its full resources behind that selection. JS&A will warranty the Sensor (even the batteries) for five full years. We'll even send you a loaner watch to use while your watch is being repaired should it ever require repair. And Sensor's advanced technology guarantees that your digital watch will be years ahead of any other watch at any price.

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Additional reading

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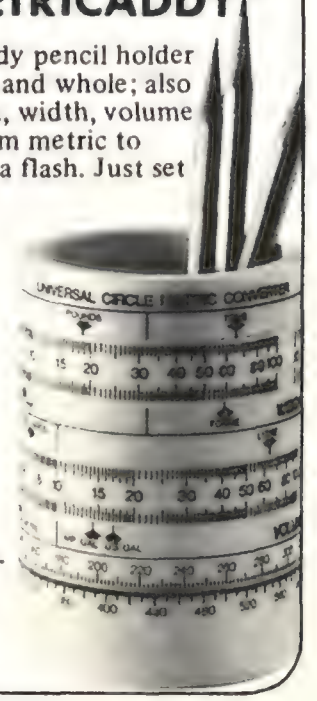

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About the Sculptor

Lawrence Beall Smith was commissioned to create the Bacchus. His works are in the permanent collections of the Metropolitan Museum of Art, the Fogg Museum, the Encyclopaedia Britannica Collection of American Painting, and the Library of Congress.

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Greater Antilles—January 3-10: Cruise aboard the motor yacht *Argonaut* and enjoy midwinter sun and rest; study architecture and historic preservation in Old San Juan, Santo Domingo and three Haitian ports; Port Antonio and the countryside around Montego Bay, with talks by Dr. Richard Howland and others • **Far East**—February 11-March 7: Singapore, plus a nine-day Indonesian cruise; in-depth tour of art and archaeology in Thailand and a visit to Hong Kong, with lectures by Mrs. Kenneth Young • **Jordan-Jerusalem**—March 8-31: Archaeology in Jordan for one week; two weeks of historic sites in and near Jerusalem (accommodations and study at St. George's College) • **Russia**—June 1-22: Emphasizing art history in Georgia and Armenia • **Baltic, Norway and the Fjords**—July 30-August 18: Cruise on the *Argonaut* to Sweden, Estonia, Russia (Leningrad), Finland; spend a week in the fjords of Norway • **The Isles of Britain**—August 19-September 3: Cruise aboard the *Argonaut* from Edinburgh at Festival time to the Orkney, Hebrides and Scilly islands, Northumbria, northern Scotland and Wales • Write Miss Bliss Schumann, Foreign Study Tours, SI 123, Smithsonian Institution, Washington, D.C. 20560 or call (202) 381-5520 for information.

Foreign Charter Tours

Mexico City and Yucatan—January 1-12, February 5-16, November 5-16 or November 19-30: A study program in Mexico City concentrating on Aztec and Toltec cultures; visits to the Mayan ruins of Chichén-Itzá, Uxmal and Palenque (originates in Mexico City) • **Australia and Tahiti**—April 11-May 5: Sydney, Melbourne, Canberra and Papeete; "lifeseeing" seminars and excursions into the countryside; choice of side trip to Great Barrier Reef, or Adelaide overland to Alice Springs, or Tasmania and Southern Australia (originates in San Francisco) • **Istanbul and Asiatic Turkey***—April 18-May 2 or October 10-24: An adventure tour including a five-day program on Byzantine and Ottoman Istanbul, followed by choice of travel seminars to Aegean Turkey, Cappadocia or the southern coast • **Russia***—May 9-23 or October 3-17: The Bolshoi, Moscow Circus, Hermitage; schools, factories and housing in Moscow, Leningrad and Tallinn • **Poland***—May 16-30: "Lifeseeing" and museum seminars in Warsaw; travel seminars to Mazurian Lakes, Gdansk, Malbork in northern Poland or Sandomierz, Zakopane and Cracow in southern Poland • **Paris and Provence***—May 23-June 6, September 26-October 10: Paris plus Avignon, Arles, Nîmes and Aix-en-Provence; museum seminars at the Louvre and Jeu de Paume; walking tours, excursions to the Loire, Chartres and Vaucluse • **The Trans-Siberian Express**—June 6-28: Fly from Seattle to Tokyo for an adventure tour on a steamer to Nahodka and train to Khabarovsk, Irkutsk and Lake Baikal; choice of travel seminars to Samarkand, Bukhara and Tashkent or the cities of old Russia • **Great Britain***—July 25-August 8 or September 12-26: The National Gallery, the British Museum, Tate, Victoria and Albert; London walking tours; choice of excursions to the English countryside; the best of London theater • Low cost of tours includes first-class hotels, most meals, sightseeing, lectures, theater tickets and air fare. Foreign tours are heavily subscribed, so write early for additional details concerning a specific trip to Smithsonian Associates Travel Program, A&I 1270B, Smithsonian Institution, Washington, D.C. or call (202) 381-5635 for information. *Optional predeparture courses will be available for those who are interested.

Smithsonian highlights

Cooper-Hewitt opens in New York
The Smithsonian's National Museum of Design, the Cooper-Hewitt Museum, is now open to the public. The introductory exhibition, "Man Transforms" (see p. 72) provides a fresh and exciting insight into the causes and effects of the design phenomenon. Twenty-six other museums and cultural institutions in New York are presenting satellite exhibitions of objects from the Cooper-Hewitt's permanent collection (see p. 194 under *Hirshhorn Museum*). A handsome catalog, *Man Transforms* by George Nelson, accompanies the show. Classes, workshops and seminars are offered at the museum. For information, call (212) 860-6868.

Freer Gallery of Art
"American Paintings: The Vision of Charles Lang Freer" is a major exhibition mounted in five large galleries and two corridors of the museum. The Freer possesses an extensive collection of works by four artists—James McNeill Whistler, Thomas Wilmer Dewing, Dwight William Tryon and Abbott Henderson Thayer. After collecting works by these artists, Freer expanded his collection to include ten other painters, among them Childe Hassam, Gari Melchers, George deForest Brush, John Francis Murphy, John Singer Sargent and Winslow Homer. All these artists are represented by major works in the exhibition—opens mid-November.

National Collection of Fine Arts
"Robert Rauschenberg" exhibits a selection of the artist's best-known works, in addition to pieces never shown publicly. The large, inclusive exhibition demonstrates the various art media Rauschen-

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berg employs, which include (often in combination) painting, assemblage, sculpture, drawings, prints, posters and photographs. This survey, encompassing 150 works from the late 1940s to the present, celebrates one of the most important, exciting and multifaceted living American artists. After closing at the first of the year, the show travels to New York's Museum of Modern Art, San Francisco's Museum of Modern Art, Buffalo's Albright-Knox Art Gallery and the Art Institute of Chicago—opens October 30.

"Jacob Kainen: Prints, a Retrospective" (see picture below) includes 70 black-and-white and color lithographs, woodcuts and intaglios, executed from 1930 in New York to the present in Paris, where the artist works in prestigious print studios. A longtime Washington-area painter, Kainen has gone through many shifts in expression and style over the last 40 years —opens November 19.

Lunch, 1936, by Jacob Kainen

"The Art of Poetry" is a unique exhibition of 50 paintings and graphics by American artists based on specific poems from American and foreign sources. In the last 15 years the collaboration of artist and poet has increased—for example, Jim Dine with Kenneth Koch, Larry Rivers with Koch and Frank O'Hara. From earlier sources there are illustrations of *haiku* and poems by John Donne, and Beaudelaire. Also included are three lithographs based on an ancient Celtic chant; interpretations by Peter Milton, Robert Motherwell and Sam Gilliam; and works by Kenneth Patchen, whose capti-

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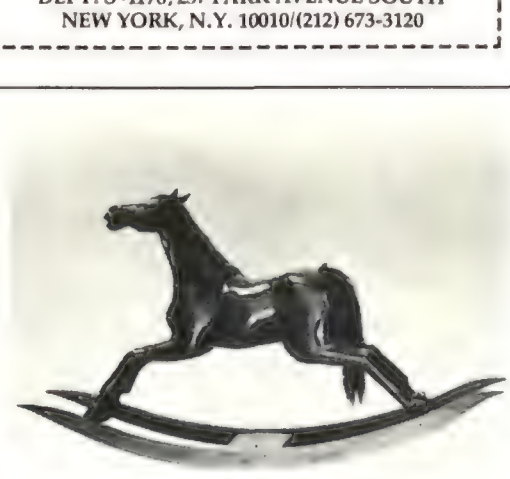

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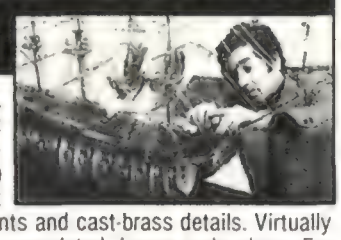

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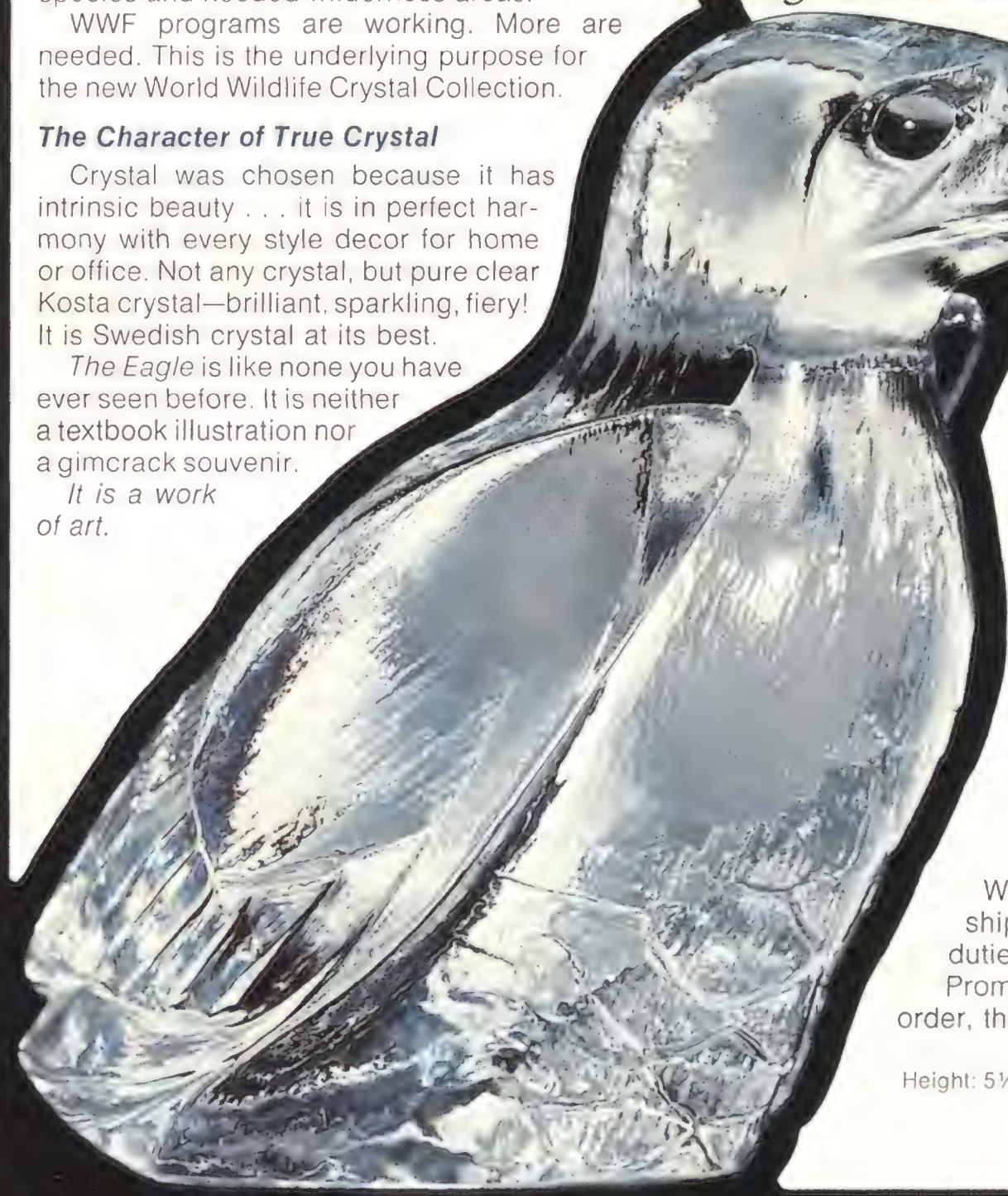

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vating "picture poems" are their own illustrations—opens November 19.

Hirshhorn Museum and Sculpture Garden
"Alfred Leslie" is an exclusive show of this contemporary realist's monumental figurative works. It includes 11 large oil paintings of traditional subjects—landscape, portraiture, allegory and history—and a small selection of drawings assembled especially for the Hirshhorn showing —opens November 11.

"Winslow Homer Drawings" celebrates the opening of the Cooper-Hewitt Museum in New York (see p. 72). The exhibition of 32 works has been selected from the Cooper-Hewitt's extensive collection of works by Homer. Subjects range from mountain scenes and landscapes to depictions of the Maine and Caribbean coasts—through December 12.

Puppet Theater, Arts and Industries Building
The Nicolo Marionettes present "Around the World in Eighty Days" Wednesdays through Sundays (closed Thanksgiving Day). Call (202) 381-5395 for show times and ticket information.

Museum of Natural History
"Treasures from Cyprus" includes 180 objects ranging from neolithic artifacts and pre-Christian antiquities to folk art of the 19th century. The exhibition reflects the history of the island, as well as its influence on the outside world. After closing at the Museum of Natural History, the show travels across the country under the auspices of the Smithsonian Institution Traveling Exhibition Service —opens November 24.

The enlarged Insect Zoo (see p. 116) is now open to the public, featuring insects and their relatives exhibited in both natural and man-made environments. Among the special creeping, crawling and flying delights are six-inch-long rhinoceros beetles, ten-inch-long walking sticks, giant millipeds, leaf-cutter ants and bees.

Divisions of Performing Arts and Musical Instruments
• The Theater Chamber Players, in residence at the Smithsonian, begin their season with a concert of Boulez, Bartók, Peter Maxwell Davies and Stockhausen,

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November 1, 8:30 P.M., Baird Auditorium, Museum of Natural History.

- Musicians from the Marlboro Music Festival open their concert series with a program of works by Schoenberg, Hugo Wolf and Dvorák, November 6, 5:30 P.M., Baird Auditorium.
- The Jazz Connoisseur series presents popular guitarist Bill Harris, November 7, 6:30 P.M., Hirshhorn Auditorium.
- The Smithsonian Chamber Players, a new ensemble dedicated to performing on authentic, antique instruments, many from the Smithsonian's own collection, open their concert series, November 8, 8:30 P.M., Hall of Musical Instruments, Museum of History and Technology.
- Tony Bennett is the guest artist of the American Popular Songs series, November 14, 8 P.M., Baird Auditorium.
- The Smithsonian's Division of Musical Instruments presents the Viola da Gamba Trio of Basel, November 22, 8:30 P.M., Hall of Musical Instruments, Museum of History and Technology.
- The Theater Chamber Players present works by Ravel, Bartók and Brahms, November 29, 8:30 P.M., Baird Auditorium.

Tickets can be purchased at the museum shops or the A&I Box Office. Call (202) 381-5395 for information about discounts for Resident Associates, senior citizens and students.

National Zoo

The renovated Birdhouse has opened to the public, featuring a new kiwi exhibit, new plantings and an enlarged skylight in the tropical flight room. Outside the Birdhouse, new yards for cranes, flamingos and other running birds are completed. Also recently renovated are the enclosed areas for larger flying birds, such as vultures.

Museum of History and Technology

"Columbus and His Time" brings the times and voyages of Christopher Columbus alive through 37 national treasures from Spain which either were owned by Columbus and King Ferdinand and Queen Isabella, or relate directly to the discovery of the New World. Among the treasures are navigational charts, personal letters, Isabella's gold and silver chest, and the pulpit from which the royal decree announcing the first voyage to the New World was read—through December.

Special to Smithsonian Associates

When visiting the Smithsonian, members are invited to register at the Associates Reception Desk in the castle on the Mall. Here, a special orientation packet may be obtained from a staff prepared to assist you from 10 A.M. to 4 P.M., seven days a week. A lounge area is also located in the Smithsonian castle.

Luncheon is available to Associates and their guests in The Court, across the Mall in the Museum of Natural History. Beer, wine, and an ample buffet menu are served in this new, elegant restaurant.

If you are planning a trip to the Smithsonian, write for information to: Associates Reception Center, Smithsonian Institution, Washington, D.C. 20560. Travel information about the original 13 states may be obtained by writing the Museum Reference Service at the same address.

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Air and Space Museum
The new museum is now open to the public (see June and September issues). The Albert Einstein Spacearium presents *Cosmic Awakening* hourly and the NASM Theater presents the film, *To Fly,* every 45 minutes. Parking is available in the museum's underground garage, open daily from 8 A.M. to 6:30 P.M.

Contributing Membership
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Fall museum hours
The Smithsonian museums have returned to regular fall hours, 10 A.M. to 5:30 P.M. daily. The Zoo is open from 9 A.M. to 4:30 P.M. and the Anacostia Neighborhood Museum from 10 A.M. to 6 P.M. weekdays and 1 to 6 P.M. weekends.

Smithsonian Institution Traveling Exhibition Service
An unusual exhibition of 19 Tunisian mosaics executed between the second and fourth centuries A.D. is touring the United States after a highly acclaimed showing at the Kennedy Center in Washington. During these centuries, the Roman empire extended through North Africa and included the province of present-day Tunisia. The area was known as the "granary of Rome," producing most of the wheat, olive oil and wine needed for the capital. Many of the mosaics are parts of larger decorative ensembles saved from the floors and walls of landowners' villas, baths, sanctuaries, temples and funerary monuments in the ancient Roman cities of Carthage, Thuburbo Majus, Dougga and Sfax.

The rich and highly detailed works rivaled mural paintings as decorative embellishments on buildings, and much of what we know about Roman paintings is reflected in the mosaics. The subjects range from themes of everyday—wrestlers, fishermen, animals—to formal, more official executions. Among the most spectacular pieces is a frontal depiction of

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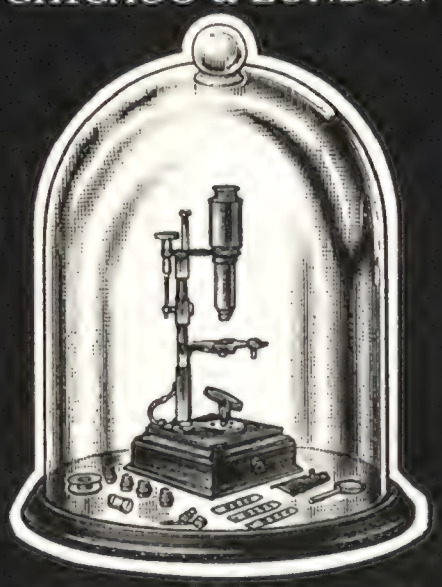

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the head of Medusa (see picture below).

The exhibition will be shown during the next year in the following cities:

• Iowa City, Iowa, at the University of Iowa, November 6-December 19. In conjunction with the exhibit's opening, the Department of Art and Art History is sponsoring a symposium on mosaics featuring experts from the University, Yale, the Louvre and the Centre National de la Recherche Scientifique in Paris. The symposium, held November 19 and 20, is open to the public. For information, call (319) 353-3266 or 353-4550.

• Rochester, New York, at the Memorial Art Gallery, January 8-February 20.

• Brunswick, Maine, at Bowdoin College, March 12-April 24.

• Philadelphia, Pennsylvania, at the University of Pennsylvania, September 3-October 9.

"Medusa," 3rd century A.D.,
from Tunisian mosaics exhibit

Other exhibitions currently on view elsewhere in the country include:

• Atlanta, Georgia—"American Presidential China" is a show of 115 ceramic objects selected from personal and state china owned or used by Presidents of the United States from Washington to Ford. Among the objects of exceptional esthetic and historic interest are a plate and bowl from the "Cincinnati" service used by George Washington and 11 decoratively detailed pieces from the famous Hayes service (Atlanta Historical Society, through January 9).

• Atlanta, Georgia—"America Underfoot" is a history of floor coverings from Colonial times to the present, presenting rugs, carpets, painted floorcloths and il-

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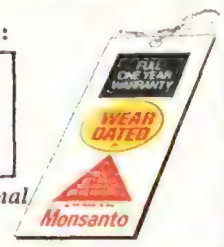

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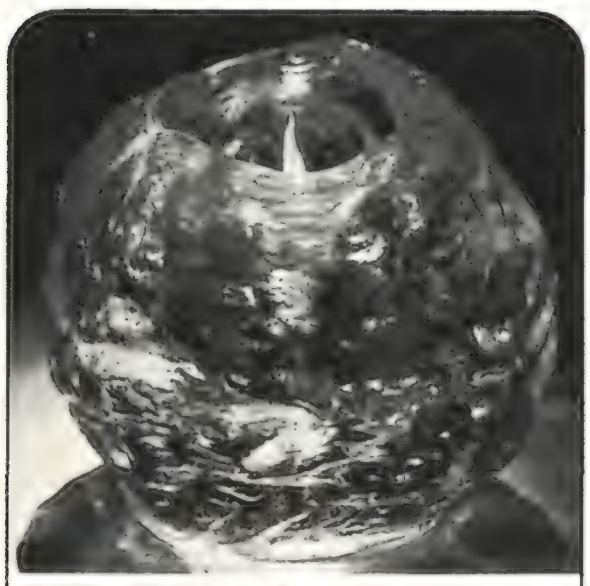

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lustrations. The exhibit surveys the historical and technical development of sanded, painted, woven, knotted and tufted floor coverings (Georgia State University, through November 21).

• Anchorage, Alaska—"Finnish Icons" is an exhibition of 35 icons painted on wood, dating predominantly from the 18th century. The brilliantly colored icons represent the sacred figures and events of Eastern Orthodox Christianity (Anchorage Historical and Fine Arts Museum, through December 1).

• Augusta, Maine—"American Prints from Wood" shows 114 prints surveying the development of the woodcut and the wood engraving in American art. Among the artists represented are Timothy Cole, Winslow Homer, Max Weber, Antonio Frasconi, Carol Summers and Leonard Baskin (University of Maine, through November 23).

• Austin, Texas—"Danish Expressions in Textile" is an exhibition of works by 20 widely known professional weavers from Denmark. The 54 weavings range from traditional tapestry to soft sculpture (University of Texas Art Museum, November 6-December 5).

• Baltimore, Maryland—"Biological Photography" includes both color and black-and-white photographs giving the viewer a close look at everyday life and the world beneath the microscope. Also included are pictures representing technical advances in laser beam and sonar photography (Maryland Science Center, through December 12).

• Fort Collins, Colorado—"Coast to Coast Coasters" covers every aspect of roller coasting from 17th-century Russian ice slides to present-day loop-the-loops and scream machines. The most authoritative exhibit yet assembled on the roller coaster includes illustrations of the top ten thrillers (Colorado State University Library, through November 28).

• Memphis, Tennessee—"Delacroix and the French Romantic Print" is a selection of significant prints by 33 French artists, with the major emphasis on works by Eugène Delacroix. Forty-four prints by Delacroix provide a comprehensive chronological view of his career as a lithographer (Brooks Memorial Art Gallery, November 6-December 5).

• Stanford, Connecticut — "American Eagle: Symbol for Survival" explains why the eagle was chosen as a national emblem in 1782, examines its significance in

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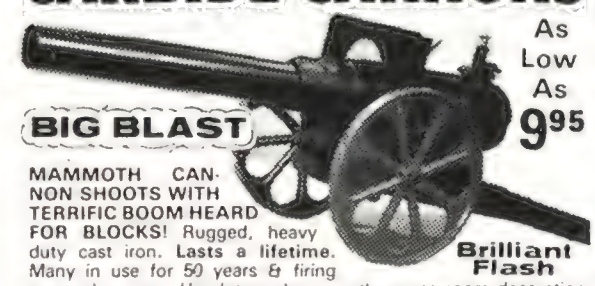

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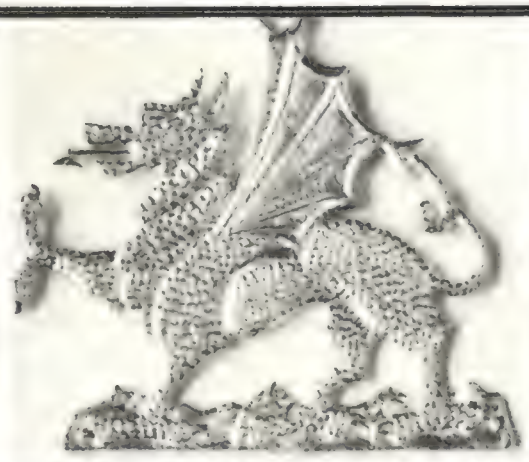

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• Storrs, Connecticut—"Edvard Munch: The Major Graphics" includes engravings, woodcuts and lithographs dating from 1894. The artist's interest in portraiture and his close ties with outstanding literary figures of the time are reflected in the exhibition. The prints exemplify Munch's technical experimentation with color (University of Connecticut, through November 21).

• Waltham, Massachusetts—"Contemporary Stage Design—U.S.A." is an exhibition of costume and scene designs encompassing work for Broadway, off Broadway, regional theater, opera, ballet and musicals. The studies reveal much about theater in America over the last ten years and explore the relationship between audience and performer (Brandeis University, November 6-December 5).

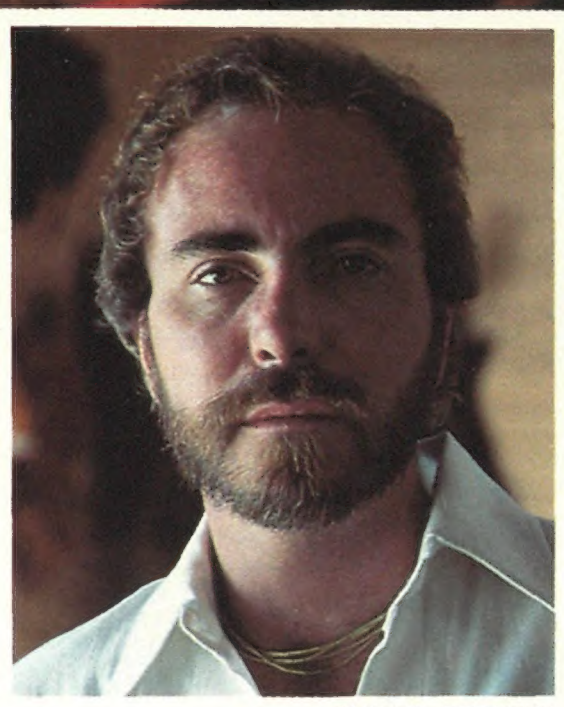
• Washington, D.C.—"Carl Jung" explores Jung's pioneering role as a therapist and presents personal glimpses of his life through photographs, drawings and texts. Included are reproductions of previously unpublished writings and drawings, such as Dr. Jung's own mysterious drawings from his "Red Book." (American Psychiatric Association, through November 14).

• "Belgian Gunmaking and American History" illustrates the mutual relationship between United States and Belgian arms manufacturers which has existed for 200 years. The exhibit features a variety of world-known Liège products, both martial and sporting, and shows for the first time the range of special models designed for the U.S. customer, which includes Kentucky rifles and heavy-weight shotguns. (Museum of History and Technology, through January 1).

• Wichita, Kansas—"The American Artist and Water Reclamation" is an exhibit of paintings, watercolors and drawings interpreting the Interior Department's Bureau of Reclamation projects, such as Grand Coulee Dam and Glen Canyon Dam. Artists represented in the show include Norman Rockwell, Fletcher Martin and Kenneth Callahan (Wichita State University, November 6-December 5).

For information on bringing an exhibition to your community, write: SITES, Smithsonian Institution, Washington, D.C. 20560 or call (202) 381-6631.

THE JEMEZ BUFFALO DANCER
(Figure shown approximately actual size) $375



MIKAEL REDMAN

THE AHÖLA KACHINA
(Figure shown approximately actual size) $475

The Nation's Foremost Precious Metal Miniaturist

Mikael Redman, born in the Indian country of northern Arizona, and schooled in the venerable European traditions of precious metal miniature sculpture, has achieved a unique blend of Old World craftsmanship and New World vigor.

His work, derivative of such masters of miniature as Cellini and Fabergé, requires hundreds of hours of the most detailed and meticulous sculpting. As only a master of the "lost wax" process could, Redman imparts breathtaking reality to his pieces by capturing the most minute of details. Fingernails, sinews, folds of cloth mere millimeters in size reveal in their exactness a skill, patience and dedication to anatomical accuracy rarely found amoung contemporary artists.

It is not surprising that Redman miniatures command prices as high as $10,000, and are found in many public and private collections around the world.

THE JEMEZ BUFFALO DANCER is representative of Redman's Southwestern Indian Series. Each of the eight native ceremonial dancers in the series exhibits the vitality, intricacy and devotion to authenticity that is Mikael Redman's signature among art critics and discriminating collectors.

Others in the series are The Pueblo Hoop Dancer, The Tesuque Eagle Dancer, The Apache Gan Dancer, The Yaqui Deer Dancer, The Hopi Snake Dancer, The Navajo Yei Dancer and The Zuni Rain Dancer.

THE AHÖLA KACHINA is the first of Mikael Redman's Kachina Spirit Series. To the Hopi Indians of the Southwest, the Kachinas are supernatural beings embodying the spiritual essence of living things and also the souls of ancestors who have died and reunited with nature. Redman's interpretation of these magical spirits is at once beautiful and haunting.

Other classic examples of Hopi Kachinas in this series are Soyal, Kaletaka and Mastop.

Rendered with the same exquisite care and artistry that has made Redman miniatures internationally famous, the series of four Kachinas adds to and extends his previous body of work, increasing all in importance and value.

Both series are cast in solid .999 fine silver with 24 carat gold vermeil accents, rhodium clad to prevent tarnishing. Each figure of the Southwestern Indian Series is mounted on an uncut turquoise base of no less than 250 carats. Nuggets vary in size and shape. Figures in the Kachina Spirit Series are mounted on either a silver or turquoise base.

Sculptures are presented in a suede-lined, oiled walnut display case which may be used as a shadowbox. Each sculpture is accompanied by a Certificate of Authenticity signed by the artist.

The Southwestern Indian Series —signed and numbered in a limited edition of 900—individual sculptures: $375. The series of eight: $2550. Due to limited quantity, The Tesuque Eagle Dancer and The Apache Gan Dancer are only available in series purchase.

The Kachina Spirit Series—signed and numbered in a limited edition of 500—individual sculptures: $475 on silver base, $500 on turquoise base. The series of four: $1600 on silver, $1700 on turquoise.

Each sculpture is also available in solid, multi-hued, 18 carat gold. Limited to an edition of 12—from $3200.

Convenient terms are available for purchase of either of the complete series.

These original sculptures may be ordered directly from The Mikael Redman Galleries, 7110 Fifth Avenue, Scottsdale, Arizona 85251.

For those desiring additional information or wishing to order by credit card, please call The Mikael Redman Galleries toll-free at 800-528-0291.

Mikael Redman's sculptures are also available at selected galleries throughout the country.

The Mikael Redman Galleries

7110 5th AVENUE
SCOTTSDALE, ARIZONA

By Francis J. Walsh

Lyndon is for the birds, just so they're crow

The Lowell Petersons in Crow Festival

"The Crow Capital of the World," the little town proclaimed itself. The bold assertion got to me. I have long had one eye on our black-feathered friend (or foe). I decided to check him out in the strong precincts claimed for him.

Lyndon, Illinois, is a town of 700 sitting on the Rock River about 40 miles upstream from where it flows into the Mississippi at Rock Island. The basis of the claim? "Because we have something to crow about," says the pleasant sixtyish woman who doubles as village clerk and town crier. The slogan ignores the distinction between *Corvus brachyrhynchos* and the barnyard rooster. But no matter. The claim is justifiable on either count, one supposes, if you have a town with near full employment, no delinquency, no drugs and sweet fresh air blowing down the lovely river valley; one policeman, two churches, three bars. One of the latter is Candy's Crow Bar where we set up editorial headquarters.

At Candy's and the nearby gun shop we learned that crows in large numbers do indeed favor the valley and that colonies of up to 25,000 could be seen in the pine groves. However, we spied only a total of three crows on two viciously cold days. But we struck gold with the story of "Rocky's Last Ride." Rocky, the crow (named after the river, of course), lived at Candy's saloon and gave it its name. He was the town pet. Went to school in the morning riding on heads and shoulders of the kids. Returned at recess to play with them and practice his schoolboy vocabulary: "Hi . . . Whatcha doin?" . . . "Nothin' " . . . "Going to school today?"

Strict observer of the territorial imperative, Rocky always stayed this side of the highway, this side of the river. He played only in the six-to-eight-block corridor of the limits of Lyndon, where he was under the protection of a village ordinance. Said ordinance even banned construction of scarecrows. But one day, as the storyteller put it ominously, Rocky rode across the bridge on the handlebars of a bike ridden by a boy playmate. Bang, he was dead. Flying loose in the alien corn on the wrong side of the river, he had taken a charge from a 20-gauge shotgun, fair game for the defensive farmer.

A local handyman made a steel coffin for Rocky, covered with pool-table felt, and the town buried him under the water tower with a $300 headstone that reads "Here Lies Rocky, The Crow. Everybody's Friend."

But Rocky lives, his memory celebrated one week each year at Lyndon's Crow Festival. Folks turn out in crow getups, wheel a six-foot cast-concrete crow effigy through the streets and, among other diversions, race each other down the Rock River in bathtubs. About 10,000 attended the first festival five years ago.

Rocky's mythologization, complete with a festival of his own, fits precisely into the great classical tradition. Apollo left his beloved Coronis in the charge of a snow-white crow while he dallied in Delphi on business. Lonesome, Coronis went in for some dalliance of her own with an Arcadian, Ischys. The crow got a bird's-eye view of this hanky-panky and the panic was on. He flew to Delphi and snitched on the pair. First recorded instance of a crow turning stool pigeon. Enraged, confusing the messenger with the message, Apollo turned the babbling bird black. And that's why to this day, etc.

The raven suffered the same fate in Noah's Ark, according to Jewish folklore. An ardent lover, he was unwilling to observe Yahweh's interdict against lovemaking on board so Noah dropped the tarbrush on him.

An intimate of the gods, though sometimes a luckless one, the crow surprises bird watchers by his capacity to live close to Man and survive. Even many of his ancient enemies, the farmers, have come to believe he does more good than evil, in contrast with the pests on p. 140. The government has taken the crow under its wing, with some degree of protection a matter of law in all 50 states. Since 1972, it's been against the law to own a pet crow. And even if you could, you wouldn't split its tongue to aid speech.

No birdbrain, the common crow may be the craftiest of all. And playful, mischievous, somehow attractive. In a world gone grim, his sense of play appeals. One watcher records a crow playing "you-chase-me-and-my-stick" with a pet dog.

On our next field expedition, I announced to my helpmate as we turned for home, we must find us a talking crow to be interviewed and a daring cook who might make up one or more of the birds into a humble pie so we learn what it is to eat crow.

Quoth she: "Nevermore!"

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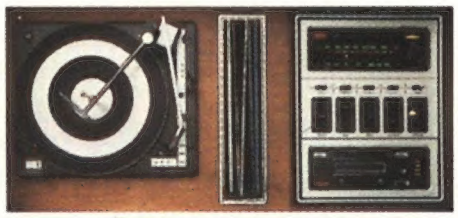

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